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ABSTRACT

The Comprehensive School Mathematics Program (CSMP) curriculum is structured in spiral form so that students will have continuing exposure to each content area throughout the program. This approach makes the presentation radically different from scope and sequence approaches commonly provided in commercial textbooks. The document is divided into four main parts: (1) The World of Numbers; (2) Probability, Statistics, and Graphing Data; (3) Problem Solving and Logical Thinking; and (4) Geometry. From the variety of activities that can occur during a year, activities viewed to exemplify a particular topic or sub-topic were identified. The material attempts to identify entries by main content area, topic, and sub-topic. (MP)

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Scope and Sequence for Upper Primary Grades

COMPREHENSIVE SCHOOL MATHEMATICS PROGRAM

CSMP

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INTRODUCTION

Mathematics should be presented as a unified whole; therefore, the CSMP curriculum is structured in spiral form so that students will have continuing exposure to each content area throughout the program.

A spiral approach makes it very difficult to represent in a typical scope and sequence the variety, frequency of appearance, and extent of coverage of any given mathematical concept or skill in the CSMP curriculum. Therefore, this scope and sequence is radically different from those commonly provided with commercial textbook series.

At each grade level, the CSMP Scope and Sequence is divided into four main content areas: The World of Numbers; Probability, Statistics, and Graphing Data; Problem Solving and Logical Thinking; and Geometry. Each of these content areas is divided into topics and, frequently, sub-topics. In the table of contents, you will find a complete listing of content areas, topics, and sub-topics for each grade level.

During the preparation of this scope and sequence, each lesson in the teachers' guides was examined carefully to identify activities that exemplify a particular topic or sub-topic. Once identified, the activity was described briefly and listed under the appropriate heading. When several similar activities occur in a single lesson, only one representative activity was described. Thus, an entry under Geometry (a main content area, indicated at upper right of page); MEASUREMENT (a topic, indicated in capitals); Length (a sub-topic, indicated by underline) may describe only one of perhaps several activities involving length in that lesson. The same lesson, however, also may be listed under another heading because it presents activities relating to other concept areas. Taken together, the entries under a single heading exhaust the lessons presenting that topic and represent a sample of the variety of activities that occur during the year.

For comparison purposes, each content area in this detailed scope and sequence corresponds to a screened sector of the accompanying scope-and-sequence chart, and each topic corresponds to a dotted spoke. Sub-topics cannot be readily identified from the chart.

We hope that the organization of this detailed scope and sequence is clear and easy to use and that you will find this information useful.

SECOND GRADE

COUNTING AND COMBINATORICS

Counting Objects

(From UPG I)

L1
22 arrows

W1
Intervals on a number line

L2
14 dots

W2
8 peanuts

G1
10 squares

W3
Squares on a grid

G2
Blocks on a grid

W4
Squares on a grid

L4
24 A-blocks

L5
24 dots

W6
Squares on a grid

G4
Shoe lengths

N13
15 dots

N14
Arrows

G5
Triangles

N15
7 dots

G6
Blocks on a grid

N17
Dots

W9
8 squares

N19
28 dots

W10
15 squares

G7
Dots

G8
C-rods

G9
Triangles

N27
36 dots

G10
C-rods

L14
23 dots

G11
25 dots

G12
32 dots

L17
11 dots

G13
12 squares

(From UPG II)

L1
30 dots

W1
Triangles

W2
Blocks on a grid

G1
Squares

L3
15 dots

N7
10 checkers

W4
Squares on a grid

G3
Blocks on a grid

L5
28 dots

W5
Blocks on a grid

G4
9 animals

W7
Squares on a grid

W8
Squares on a grid

G6
Blocks on a grid

L10
32 dots

W10
Blocks on a grid

G7
32 squares

L12
36 dots

W12
8 numbers

L14
36 outcomes

W14
Floors in a building

G10
Triangles

W15
Sticks

N32
Arrows

N34
Arrows

COUNTING AND COMBINATORICS

Skip Counting

(From UPG I)

N2
By 2s, 3s, and 4s

N4
By 5s

W2
By 2s

W3
By 2s, by 3s

N7
By 10s

N8
By 2s, by 5s

W4
By 2s, 3s, and 5s

N10
By 5s, by 10s

W6
By 2s, 3s, and 5s

N13
By 3s, by 5s

L8
By 2s, by 10s

W7
By 3s, 5s, and 10s

W8
By 3s

N18
By 3s, by 5s

W9
By 2s, by 3s

W10
By 2s, 3s, and 5s

N22
By 10s

W11
By 5s

L11
By 5s, by 10s

N24
By 3s

W12
By 2s, 3s, 5s, and 10s

N25
By 2s

W13
By 5s

N28
By 10s

W14
By 5s with a hand-calculator

W15
By 2s, by 10s

G11
By 5s, by 6s

N31
By 10s

N32
By 5s

W16
By 2s, by 3s

N36
By 10s

(From UPG II)

W1
By 2s, by 3s

N4
By 2s on a number line

W2
By 5s, by 10s

N6
By 10s

N10
By 2s, by 3s

W6
By 11s

W7
By 2s, 3s, 5s, and 10s

W8
By 5s, by 10s

L9
By 3s

W9
By 9s

L10
32 dots

W12
By 3s

W13
By 2s to 6s, by 15s

W14
By 3s on a 0-to-50 numeral chart

N30
By 3s, by 5s on a number line

W15
By 5s, 10s, and 100s

N32
By 10s

N34
By 2s, by 5s

W17
By 3s, by 4s

N36
By 3s, 4s, 6s, and 9s on a number line

COUNTING AND COMBINATORICS

Counting

(From UPG I)

W3
From 0 to 18

N7
From 1 to 10

W6
From 3 to 25

W7
From 96 to 101

L8
From 1 to 15

W9
From 10 to 16

W12
From 9 to 14

W13
From 105 to 111

(From UPG II)

N4
From 1 to 19

N10
From 3 to 22

W8
From $\hat{6}$ to 3

Counting Backward

(From UPG I)

N2
By 3s

W3
By 2s

From 13 to 7

N8
By 2s

W4
By 2s, 3s, 5s, and 10s

W6
By 2s

From 13 to 8

W7
By 2s, 3s, and 9s

From 500 to 496

N18
By 2s

W9
By 2s

From 15 to 5

W10
By 2s, by 3s

N22
By 10s

N24
By 3s

W12
By 2s

From 20 to 11

W13
By 2s

From 113 to 94

N28
By 10s

W15
From 15 to 10

N32
By 5s

W16
By 5s

From 101 to 97

W17
By 3s

(From UPG II)

W1
By 2s, 3s, and 10s

N4
By 3s on a number line

W2
By 2s

From 8 to $\hat{6}$

W7
By 2s

From 40 to 7

N16
By 10s

From 51 to 48

W8
By 10s

W11
By 2s, 4s, 5s, and 10s

From 7 to $\hat{3}$

W12
By 10s

From 25 to 21

W13
By 3s

N28
By 5s

COUNTING AND COMBINATORICS

Estimating Quantity

(From UPG I)

G7
Of dots of various sizes needed to completely cover the board

Estimate when one minute has elapsed.

(From UPG II)

G4
1,000 dots

W14
Number of floors above ground in the Empire State Building

Combinatorics

(From UPG I)

W5
Find all of the numbers that can be put on one Minicomputer board with exactly two regular checkers.

L6
Each of five coins is either a dime, a nickel, or a penny.

W11
Find all of the numbers that can be put on one Minicomputer board with exactly three regular checkers.

L11
Each of two coins is either a quarter, a dime, a nickel, or a penny.

(From UPG II)

N6
Find all of the numbers that are the sum of seven addends each of which is either 1 or 10.

W3
Find all of the numbers that can be put on one Minicomputer board with one regular and one negative checker.

L12
Find all of the possible outcomes of the throw of two distinct dice.

L14
Find all of the possible outcomes of the throw of two distinct dice.

L16
Find all of the possible combinations of three different coins.

NUMERATION AND PLACE VALUE

Numeral Recognition

(From UPG I)

N1
7 to 126

N3
2 to 196

G1
1 to 20

N5
4 to 900

L6
10 to 260

W3
12 to 16

W4
1 to 100

N17
12,000

W9
8 to 21

W10
7 to 300

N25
1,200

N26
2,016

N28
3 to 190

W14
17 on a hand-calculator

N31
20,000

N35
40,000

L17
38

(From UPG II)

W1
0 to 110

N3
1/2

N4
7 to 199

W2
1 to 1,001

G2
0 to 100

N10
3 1/2

N11
1,979

W6
0 to 143 on a hand-calculator.

W7
2 to 957

W8
3 to 201

L9
66 to 5,050

W9
0 to 162 on a hand-calculator

N19
1.5

N20
1/2

G7
1/16, 1/12, 1/8, 1/6, 1/4, 1/3, and 1/2

N21
0.4 to 21.48

W12
0 to 207

W13
30 to 150

W15
0 to 24; 367

G11
1/12, 1/9, 1/6, 1/3, and 1/2

N31
0.14 to 1.00

W16
0 to 999

G12
0 to 100

N33
33.33

N35
0.09 to 3.50

NUMERATION AND PLACE VALUE

Writing Numerals

(From UPG I)

N1
1 to 87

N2
1 to 54

W1
2 to 1,004

N4
0 to 100

W2
6 to 11

N8
0 to 29

N9
15 to 8,020

N10
7 to 42

N12
1 to 204

W6
0 to 87

N14
3 to 30

W7
2 to 503

G5
1 to 12

N16
6,000,000;
0 to 800

W8
12 to 99

N17
3 to 1,665

N20
0 to 250

N21
0 to 621

N22
0 to 23

N24
0 to 100

W12
9 to 100

N25
10 to 180;
1,200

W13
8 to 906

N29
7 to 424

N30
8 to 20

W15
0 to 102

N31
20 to 549;
20,000

N32
0 to 89

W16
10 to 500

N33
5 to 738

N35
40,000

(From UPG II)

N1
4 to 480

N2
1 to 800

W1
9 to 111

W2
6 to 1,112

N6
1 to 61

N7
20 to 777

N8
12 to 88

N9
1 to 861

N12
0 to 100

W6
51 to 96

G4
64,000

N13
1 to 256

W7
2 to 841

G5
5 to 60

W8
10 to 600

N17
11 to 605

L9
10 to 400

N18
25 to 97

W10
6 to 50

N21
1.5 to 74.02

N23
2 to 8,070

N24
6 to 360

W12
0 to 207

N25
36 to 11,920

N26
2 to 102

W13
30 to 150

N32
1 to 61

N34
1 to 63

N36
0 to 36

NUMERATION AND PLACE VALUE

Place Value

(From UPG I)

N1
Tens and ones

N3
Hundreds, tens, and ones

N5
10,000s; 1,000s; 100s; 10s; and 1s

N7
Tens and ones

N9
1,000s; 100s; 10s; and 1s

N17
1,000s; 100s; 10s; and 1s

N25
1,000s; 100s; 10s; and 1s

G10
7 orange and 6 white C-rods are equal to 76 white C-rods.

N31
1,000s; 100s; 10s, and 1s

N33
Hundreds, tens, and ones

N35
1,000s; 100s; 10s; and 1s

(From UPG II)

N6
Tens and ones

N7
Hundreds, tens, and ones

N8
Tens and ones.

N9
1,000s; 100s; 10s; and 1s

W7
Hundreds, tens, and ones

N15
1,000s; 100s; 10s; and 1s

W8
Hundreds, tens, and ones

N17
Hundreds and tens

N19
Dollars, dimes, and pennies

N21
Dollars, dimes, and pennies

N25
Hundreds, tens, and ones

W13
Tens and ones

W15
Hundreds, tens, and ones

N31
Dollars, dimes, and pennies

N32
Hundreds, tens, and ones

N33
Dollars, dimes, and pennies

NUMERATION AND PLACE VALUE

Representing Numbers on the Minicomputer

(From UPG I)

N1
1 to 126

N3
1 to 800

W2
21

N5
53 to 750

W3
7

W4
12

N9
15 to 8,020

W5
39 + 25

N11
367

W6
1 to 87

W7
7 to 604

W8
60

N17
9,000

N18
37

W9
1 to 48

N19
2 to 97

W10
7 to 35

N23
20

L11
10, 20, 30, 50

W12
6 to 86

W13
8 to 906

N27
22 to 6,115

W14
68 + 45

N29
7 to 1,130

W15
7 to 79

W16
10 to 110

L17
88

(From UPG II)

N1
4 to 480

W1
18 to 97

N3
7 to 8,700

W2
25 to 1,112

N5
187 to 692

W3
7 to 7

N7
20 to 729

N9
40 to 1,000

N11
3,958

W6
51 to 270

N13
1,310

N14
108

W7
13 to 957

N15
46; 12,000

W8
8 to 600

N17
127 to 920

W9
9 to 90

N19
0.25 to 1.50

N21
0.29 to 4.66

N23
65 to 1,130

N24
2 to 7,000

W12
11 to 207

W13
30 to 150

N27
1,887

W14
19

W15
0 to 1,955

W16
0 to 999

N33
33.33

W17
81, 84

ORDER

Comparing Sets

(From UPG I)

L1
Of 0 to 4 elements

G1
To a set of 10 squares

W4
Of 7 and 4 elements

N14
Of 8 and 10 elements

G9
To a set of 8 squares

(From UPG II)

L3
To a set of 6 elements

Story Problems

(From UPG I)

W4
The school with more fish will be eaten.

(From UPG II)

W14
A janitor travels up and down in an elevator.

Number Line

(From UPG I)

W1
0 to 1,004

W6
0 to 100

W7
15 to 503

W12
0 to 100

W13
104 to 426

G10
100 cm tape measure

L15
-20°C to 20°C

(From UPG II)

W1
65 to 111

N4
-7 to 200

W2
105 to 1,002

G2
100 cm tape measure

N10
-7 to 23

L6
-20 to 20

W7
49 to 113

G5
100 cm tape measure

W8
-6 to 202

G9
100 cm tape measure

W14
-3 to 5

N30
-3 to 45

G12
100 cm tape measure

N35
0 to 10 (decimals)

N36
-6 to 36

ORDER

Comparing Numbers

(From UPG I)

W1
To an unknown number on a number line

N3
To 36

N4
$n < n + 5$

W2
To 16 and 24

N5
Change one addend in a sum and determine whether the sum is now more, the same, or less than before.

N6
Twice as many as 1 to at least 1 more than 1

W3
To 12

W4
Less than 10

N8
$n + 2$ and n

N10
$n + m$ and n

W5
More than 8

W6
To an unknown number on a number line

$3 + 8 < 4 + 8$

G4
35 and 44

L6
$n + 5$ and 30

N14
$15 + 2$, $15 + 3$, and 16

W7
$6 + 10 > 10$

N16
$2n$ and n

W8
Less than 70

N18
To 37

W9
More than 10

W10
More than 15

N22
$n + m$ and n

W11
To 20 and 10

L11
To 25 and 45

N24
$n - m$ and n

W12
To an unknown number on a number line

W13
$n + 4$ and n

N28
n, $n + 10$, and $n - 10$

W14
Numbers more than 72 and 50

W15
n, $n + m$, and mn

G11
36 is 11 more than 25.

N31
To 789

L15
2°C and 3°C

N32
$n + 5$ and n

W16
n, $n + m$, $n - m$, and mn

N33
Change one addend in a sum and determine whether the sum is now more, the same, or less than before.

N34
2×87 and $87 + 38$

$\square - m$ and n

N36
n, $n + 10$, and $n - 1$

(From UPG II)

N1
Change one addend in a sum and determine whether the sum is now more, the same, or less than before.

20 is 19 more than 1.

L2
More than 5

N4
To an unknown number on a number line

ORDER

Comparing Numbers - Continued

W2
Less than 10

N5
600 and (4 x 100) + (4 x 40) + (4 x 20)

N6
10 + 10 + 10 + 10 and 10 + 10 + 10 + 1

W3
Less than 3

N7
496 is 4 less than 500

N8
20 - 1 + 10 + 10 + 10 and 20 + 10 + 10 - 1 - 1

N10
To an unknown number on a number line

N11
To 1,979

L6
To 0

N12
15, 16, 17, and 18

W6
To 40 and 100

N13
To 655

W7
Change one addend in a sum and determine whether the sum is now more, the same, or less than before.

800 is 600 more than 200.

G5
45 is 22 less than 67.

N15
To 131

N16
n - 10 and n

W8
Less than 20

N17
127 < 200

N18
n + 10 + 10 and n + 7 + 7 + 7

W9
Less than 100

W10
12, 14, and 38

N21
$1.25 and $2

W11
9 is not more than 9.

n + $\hat{m}$ and n

N24
To 180

W12
61, 100, and 58

n, 2n, and 3n

G9
43 is 9 less than 52.

N25
437 > 283

L13
At least five but not more than ten

W13
36 + 19, 36, and 36 - 19

L14
To 7

N28
n - 10 and n

W14
Less than 50

$\hat{3}$ is 7 less than 4.

N29
1/3 x 36 and 10

N31
25¢ + 14¢ and 50¢

N32
0 + 1 + 1 + 10 + 10 and 0 + 100 + 100 + 1 + 10

N33
1/2 x 78 and 1/3 x 78

L16
Smaller than 50

N34
(n + 5) x 2 and (n x 2) + 5

84 is 5 more than 79.

W17
Not more than 90

102 is 16 more than 86.

N35
1.50 and 0.80

To an unknown number on a number line

L17
Less than 0

ADDITION

Joining Sets

(From UPG II)

W15
20 + 20 + 5 = 45

Story Problems

(From UPG I)

N7
A long addition problem must be solved.

N9
Purchases are made at a candy store.

W7
Two boys each have rock collections.

N15
Purchases are made at a toy store.

N17
Many balloons are purchased.

N23
Purchases are made at a bake sale.

(From UPG II)

G5
An ant follows a zigzag path to food.

L10
A child walks from home to the bookstore and candy store before returning home.

N21
Four models are purchased.

G9
An ant follows a zigzag path to food.

N25
Two children have baked cookies for a picnic.

W15
Additional sticks are brought.

N31
Two plants are purchased for exactly 50¢.

N35
Two whistles are purchased for exactly $1.

ADDITION

Basic Facts and Mental Arithmetic

(From UPG I)

N1
20 + 20 = 40

N2
8 + 3 = 11

N3
10 = 8 + 2

N4
16 + 5 = 21

G1
10 + 10 = 20

N5
8 + 4 + 1 = 13

W3
Sums of 12

N7
Sums of 10

N8
21 + 5 = 26

W4
6 = 2 + 4

G3
13 + 13 = 26

N9
Sums of 20

N10
35 + 2 + 3 + 2 + 3 = 45

W5
9 + 3 = 12

N12
4 + 9 = 13

If 4 + n = 17; find n.

W6
10 + 2 = 9 + 3

N13
40 = 20 + 20

L6
110 + 10 = 120

N14
8 + 3 = 11

W7
Sums of 20

N15
Sums of 20

W8
47 + 3 = 50

N17
Sums of 20

L8
7 + 2 = 9

N18
29 + 8 = 37

W9
6 + 3 = 9

N19
60 + 24 = 84

N20
If n + n = 70; find n.

W10
13 + 5 = 18

N21
140 + 10 = 150

N22
29 + 5 = 34

W11
19 + 5 = 24

N23
Sums of 30

L11
190 + 10 = 200

N24
8 + 3 = 11

W12
21 + 4 = 25

N25
Sums of 40

N26
300 + 300 = 600

W13
15 + 10 = 25

N27
200 = 100 + 100

N28
23 + 10 = 33

N29
400 = 200 + 200

N30
12 + 5 = 17

W15
22 + 10 = 32

N31
654 + 135 = 789

N32
26 + 5 = 31

W16
18 + 3 = 21

N33
800 + 200 = 1,000

W17
5 + 2 = 7

L17
44 + 44 = 88

N36
24 + 9 = 33

ADDITION

Basic Facts and Mental Arithmetic - Continued

(From UPG II)

W1
28 + 4 = 32

N4
9 + 2 = 11

W2
53 + 10 = 63

N5
200 + 50 + 12 = 262

N6
12 + 10 = 22

W3
7 + 4 = 11

N7
(2 x 100) + (3 x 20) + 5 = 265

N8
13 + 10 = 23

N9
100 + 500 + 200 = 800

N10
9 + 3 = 12

N12
8 + 1 = 9

W7
17 + 5 = 22

G5
4 + 8 = 12

L8
Sums of 20

W8
66 + 5 = 71

L9
18 + 3 = 21

N18
76 + 7 = 83

L10
16 = 5 + 5 + 6

N20
Sums of 20

W10
39 + 15 = 54

N21
75 + 50 = 125

N22
5 + 20 = 25

N23
200 + 192 = 392

L12
6 + 5 = 11

N24
260 + 10 = 270

W12
14 + 3 = 17

G9
7 + 9 = 16

N25
1 + 3 + 8 = 12

L13
7 + 5 = 12

N26
Sums of 100

W13
12 + 8 = 20

L14
Sums of 6

G10
2 + 2 + 1 + 1 + 1 + 1 = 8

N29
10 + 2 = 12

N30
99 + 3 = 102

W15
4 + 4 + 1 = 9

N31
36 + 14 = 50

N32
11 + 100 = 111

W16
80 + 10 + 8 + 2 = 100

L16
25 + 10 + 1 = 36

N34
74 + 5 = 79

W17
20 + 12 = 32

N35
64 + 36 = 100

N36
24 + 12 = 36

On the Minicomputer

(From UPG I)

N3
14 + 22 = 36

N7
1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55

N9
6 + 5 + 14 + 7 + 13 + 15 + + 10 = 70

N15
20 + 20 + 20 + 20 = 80

N18
13 + 24 = 37

N31
654 + 135 = 789

N33
453 + 276 = 729

(From UPG II)

N7
453 + 276 = 729

N9
576 + 287 = 863

N19
(9 x 10¢) + 25¢ = $1.15

N21
0.62 + 2.30 + 1.45 + 0.29 = 4.66

ADDITION

Estimation

(From UPG I)

N3
16 + 28

N5
Number on the Minicomputer

N31
239 + 326

N33
453 + 276

N34
87 + 38

(From UPG II)

N1
Number on the Minicomputer

N5
Number on the Minicomputer

N7
453 + 276

N9
576 + 287

N11
Number on the Minicomputer

W7
Number on the Minicomputer

N21
0.62 + 2.30 + 1.45 + 0.29

N31
25¢ + 14¢ is less than 50¢.

N35
25 + 74 is approximately 100.

Vertical Format and Algorithm

(From UPG I)

N31
654
+135
789

N33
453
+276
729

(From UPG II)

N7
288
+371
659

N9
296
+357
653

W7
512
+329
841

G5
22 cm
17 cm
10 cm
+24 cm
73 cm

W8
437
+283
720

N23
130
+400
530

G9
16 cm
16 cm
9 cm
+11 cm
52 cm

N25
437
+283
720

N27
629
629
+ 629
1,887

N31
0.14
0.45
+0.38
0.97

N33
33.33
33.33
+33.33
99.99

N35
0.80
0.75
+0.45
2.00

Properties

(From UPG II)

N32
0 + 100 + 1 + 1 + 1 = 0 + 1 + 100 + 1 + 1

MULTIPLICATION

Repeated Addition

(From UPG I)

N3
2 x 14 = 14 + 14

G1
10 + 10 = 2 x 10

N6
4 + 4 = 2 x 4

L4
8 + 8 + 8 = 3 x 8

N11
4 + 4 + 4 = 3 x 4

N13
3 x 5 = 5 + 5 + 5

G5
2 + 2 + 2 + 2 + 2 + 2
= 6 x 2

N16
23 + 23 = 2 x 23

N17
20 + 20 + 20 + 20
+ 20 = 5 x 20

N19
7 + 7 + 7 + 7 = 4 x 7

N21
75 + 75 = 2 x 75

N23
30 + 30 + 30 + 30 =
4 x 30

N25
4 + 4 + 4 = 3 x 4

N26
10 + 10 = 2 x 10

N27
4 x 9 as a 4-by-9 dot array

G11
6 x 6 as a 6-by-6 dot array

N34
2 x 87 = 87 + 87

(From UPG II)

N3
4 + 4 = 2 x 4

G4
1,000 + 1,000 + 1,000
+ 1,000 = 4,000

N14
3 x 12 =
(12 + 12) + 12

N23
2 x 65 = 65 + 65

N27
3 x 629 =
629 + 629 + 629

N29
6 + 6 + 6 = 3 x 6

N30
3 + 3 + 3 + 3 + 3 =
5 x 3

W15
4 + 4 + 4 = 3 x 4

N33
3 x 33.33 =
33.33 + 33.33 + 33.33

N36
6 + 6 = 2 x 6

Story Problems

(From UPG I)

N6
The number of fish is doubled.

L6
Each student in the class has a dime.

L11
Each student in the class has a nickel.

(From UPG II)

N14
Each day a child will receive three times as much money as the day before.

N17
$20 bills are used to form $200.

MULTIPLICATION

Basic Facts and Mental Arithmetic

(From UPG I)

N1
Two 10s is 20.

N3
Ten 10s is 100.

N6
2 x 16 = 32

W3
3 x 4 = 12

N7
Fifteen 10s is 150.

W4
2 x 7 = 14

W5
3 x 4 = 12

W7
2 x 11 = 22

G5
6 x 2 = 12

N16
If 2n = n; find n.

N17
Twelve 10s is 120.

L8
4 x 2 = 8

N18
2 x 37 = 74

W9
2 x 4 = 8

N19
3 x 28 = 84

W10
3 x 4 = 12

N21
2 x 14 = 28

N23
5 x 4 = 20

W12
2 x 1 = 2

N25
3 x 40 = 120

N26
2 x 63 = 126

W13
5 x 5 = 25

N27
2 x 125 = 250

N29
2 x 265 = 530

W15
2 x 11 = 22

G11
5 x 5 = 25

N31
10 x 2 = 20

W16
6 x 3 = 18

N33
Ten 10s is 100.

W17
2 x 5 = 10

N35
10 x 4 = 40

(From UPG II)

N2
2 x 26 = 52

W1
3 x 3 = 9

N3
2 x 7 = 14

W2
3 x 7 = 21

N5
2 x 333 = 666

N7
3 x 20 = 60

N9
10 x 4 = 40

N10
Nine 2s is 18.

N11
2 x 15 = 30

N12
2 x 0 = 0

G4
8 x 8 = 64

N13
2 x 2,000 = 4,000

N14
3 x 4 = 12

W7
4 x 5 = 20

N15
10 x 9 = 90

L8
1 x n = n

W8
3 x 9 = 27

N17
20 x 8 = 160

L9
100 x 3 = 300

N19
2 x 103 = 206

N23
2 x 65 = 130

N24
10 x 70 = 700

W12
2 x 6 = 12

W13
2 x 7 = 14

N27
3 x 7 = 21

G10
2 x 8 = 16

W15
3 x 3 = 9

N34
2 x 37 = 74

W17
4 x 4 = 16

MULTIPLICATION

On the Minicomputer

(From UPG I)

N3
2 x 37 = 74

N17
5 x 20 = 100

N19
3 x 28 = 84

N21
2 x 75 = 150

N23
4 x 30 = 120

N25
3 x 400 = 1,200

N26
2 x 126 = 252

N27
2 x 243 = 486

N29
2 x 565 = 1,130

N31
10 x 20 = 200

N35
10 x 400 = 4,000

(From UPG II)

N2
2 x 88 = 176

N3
2 x 393 = 786

N5
2 x 262 = 524

N7
10 x 40 = 400

N9
10 x 80 = 800

N14
3 x 36 = 108

N15
10 x 90 = 900

W8
10 x 9 = 90

N17
10 x 92 = 920

N23
2 x 565 = 1,130

N24
10 x 48 = 480

N27
3 x 629 = 1,887

Estimation

(From UPG I)

N3
2 x 14

L6
26 dimes

L11
26 nickels

N27
2 x 75

N34
2 x 87

(From UPG II)

N2
2 x 176

N5
2 x 262

N14
3 x 36

N27
3 x 629

Properties

(From UPG I)

N11
3 x 4 = 4 x 3

N13
3 x 5 = 5 x 3

N19
4 x 7 = 7 x 4

3 x 28 = (3 x 20) + (3 x 8)

N21
2 x 75 = (2 x 70) + (2 x 5)

N27
4 x 9 = 9 x 4

5 x 22 = (5 x 20) + (5 x 2)

N29
2 x 565 = (2 x 500) + (2 x 65)

(From UPG II)

N5
2 x 187 = (2 x 100) + (2 x 80) + (2 x 7)

N14
3 x 12 = (2 + 2 + 2) + (10 + 10 + 10)

N17
20 x 8 = 8 x 20

N23
2 x 396 = (2 x 300) + (2 x 96)

N27
2 x 3 = 3 x 2

3 x 24 = (3 x 20) + (3 x 4)

SUBTRACTION

Partitioning of Sets

(From UPG II)

N15
13 - 5 = 8

W15
74 - (3 x 3) = 65

Estimation

(From UPG I)

N3
53 - 42

N34
87 - 29

(From UPG II)

N1
535 - 284

N15
296 - 165

N17
200 - 127

Inverse of Addition

(From UPG I)

N2
7 + 3 = 10,
10 - 3 = 7

N4
5 + 5 = 10,
10 - 5 = 5

N8
7 + 2 = 9,
9 - 2 = 7

N24
1 + 3 = 4,
4 - 3 = 1

N28
29 + 10 = 39
39 - 10 = 29

N32
27 + 5 = 32,
32 - 5 = 27

(From UPG II)

N16
6 + 10 = 16,
16 - 10 = 6

N17
200 - 127 = □,
127 + □ = 200

N18
86 - 10 = 76,
76 + 10 = 86

W15
74 - 9 = 65,
65 + 9 = 74

Story Problems

(From UPG I)

N11
Some candies are eaten.

N13
Some marbles are given away.

G11
Determine how many more hiding places one child has than another.

(From UPG II)

N15
Some checkers are given away.

N17
A television is purchased with $200.

N21
A purchase is made with 2 one-dollar bills.

W15
Some sticks are stolen.

SUBTRACTION

Basic Facts and Mental Arithmetic

(From UPG I)

N2
10 - 3 = 7

N4
16 - 5 = 11

W3
15 - 3 = 12

N8
17 - 2 = 15

W4
17 - 5 = 12

N11
17 - 3 = 14

N12
7 - 3 = 4

W6
7 - 2 = 5

N13
58 - 10 = 48

N14
13 - 2 = 11

W7
10 - 8 = 2

L8
4 - 3 = 1

W9
16 - 3 = 13

W10
18 - 3 = 15

N21
265 - 200 = 65

N24
12 - 3 = 9

W12
10 - 5 = 5

W13
100 - 99 = 1

N28
38 - 10 = 28

N30
15 - 3 = 12

W15
102 - 1 = 101

G11
36 - 25 = 11

N32
32 - 5 - 5 - 5 = 17

W16
20 - 4 = 16

W17
12 - 4 = 8

N36
24 - 1 = 23

(From UPG II)

W1
11 - 3 = 8

N4
8 - 3 = 5

W2
10 - 6 = 4

N8
53 - 1 = 52

W7
20 - 2 = 18

G5
67 - 45 = 22

N15
100 - 46 = 54

N16
81 - 33 = 48

W8
5 - 4 = 1

N18
41 - 6 = 35

N21
2.00 - 1.25 = 0.75

N22
24 - 20 = 4

W11
107 - 10 = 97

W12
76 - 10 = 66

G9
52 - 43 = 9

W13
42 - 3 = 39

N28
153 - 30 = 123

W14
50 - 1 = 49

On the Minicomputer

(From UPG I)

N3
37 - 14 = 23

N11
75 - 30 = 45

N13
58 - 24 = 34

N19
56 - 12 = 44

N21
265 - 41 = 224

N27
317 - 104 = 213

N29
689 - 40 = 649

W17
95 - 69 = 26

(From UPG II)

N1
535 - 284 = 251

N15
296 - 165 = 131

DIVISION

Equal Partitioning of Sets

(From UPG I)

G3
1/2 x 26 = 13

G12
1/2 x 24 = 12

G13
1/3 x 12 = 4

(From UPG II)

N3
1/2 x 10 = 5

W7
1/2 x 18 = 9

W8
1/3 x 21 = 7

G7
1/3 x 12 = 4

N27
1/3 x 12 = 4

N29
1/3 x 18 = 6

W15
1/3 x 12 = 4

G11
1/3 x 24 = 8

Inverse of Multiplication

(From UPG I)

N26
2 x 63 = 126,
1/2 x 126 = 63

G12
12 + 12 = 24,
1/2 x 24 = 12

(From UPG II)

N2
2 x 26 = 52,
1/2 x 52 = 26

N3
2 x 23 = 46,
1/2 x 46 = 23

N5
2 x 346 = 692,
1/2 x 692 = 346

N11
2 x 10 = 20,
1/2 x 20 = 10

N27
3 x 14 = 42,
1/3 x 42 = 14

N29
3 x 3 = 9,
1/3 x 9 = 3

G11
3 x 7 = 21,
1/3 x 21 = 7

Story Problems

(From UPG I)

G3
Share fairly 26 cookies of irregular shapes between two children.

G13
Share 12 pieces of cake fairly among four children.

(From UPG II)

N19
Share $30 equally between two children.

G7
Share fairly a cake that has been divided into 12 pieces among six people.

N29
A farmer wishes to share his animals fairly among his three children.

G11
Share fairly a cake with 24 pieces among 12 persons.

N33
Share fairly $78 between two children.

DIVISION

Basic Facts and Mental Arithmetic

(From UPG I)

G3
1/2 x 26 = 13

G7
1/2 x 60 = 30

N26
1/2 x 600 = 300

W16
1/2 x 30 = 15

G12
1/2 x 32 = 16

G13
1/2 x 12 = 6

(From UPG II)

N2
1/2 x 1,000 = 500

N3
1/2 x 46 = 23

W2
1/2 x 24 = 12

N10
Determine the number that is halfway between 0 and 2 million on a number line.

N11
1/2 x 24 = 12

N13
1/2 x 10,000 = 5,000

W8
1/3 x 3 = 1

N19
1/2 x 30 = 15

W13
1/2 x 48 = 24

N27
1/3 x 300 = 100

G10
1/2 x 8 = 4

N29
1/3 x 30 = 10

N33
1/2 x 70 = 35

On the Minicomputer

(From UPG II)

N3
1/2 x 14 = 7

N5
1/2 x 692 = 346

N11
1/2 x 314 = 157

N13
1/2 x 36 = 18

N19
1/2 x 3 = 1.5

N29
1/3 x 45 = 15

N33
1/2 x 78 = 39

Estimation

(From UPG II)

N11
1/2 x 3,958

N13
1/2 x 1,310

N29
1/3 x 495

N33
1/3 x 78

Properties

(From UPG II)

N13
1/2 x 46 =
(1/2 x 40) +
(1/2 x 6)

N29
1/3 x 36 =
(1/3 x 30) +
(1/3 x 6)

FRACTIONS

Equal Partitioning of Sets

(From UPG I)

G3
1/2 x 26 = 13

G12
1/2 x 24 = 12

G13
1/3 x 12 = 4

(From UPG II)

N3
1/2 x 10 = 5

W7
1/2 x 18 = 9

W8
1/4 x 24 = 6

G7
1/6 x 12 = 2

N27
1/4 x 12 = 3

N29
1/3 x 18 = 6

W15
1/9 x 45 = 5

G11
1/6 x 24 = 4

Equal Partitioning of Wholes

(From UPG I)

G1
A diagonal line cuts a square into two triangles.

W4
A diagonal line cuts a square into two triangles.

G3
Cut cookies into halves using a line of symmetry.

W7
Divide letters of the alphabet into two equal parts.

G5
A diagonal line cuts a square into two triangles.

W10
A diagonal line cuts a square into two triangles.

G9
A diagonal line cuts a square into two triangles.

G13
Cut a rectangle into three equal parts.

(From UPG II)

G1
A diagonal line cuts a square into two triangles.

W7
Cut shapes into two equal parts.

G7
Divide a circular shape into eight equal parts.

G8
A diagonal line cuts a square into two triangles.

G10
A diagonal line cuts a square into two triangles.

FRACTIONS

Story Problems

(From UPG I)

G3
Share fairly a cake between two children.

G13
Share fairly a cake that has been cut into 12 pieces among four children.

(From UPG II)

N19
Share $300 equally between two children.

G7
Share fairly a cake that has been divided into 32 pieces among four people.

N29
A farmer wishes to share his animals equally among his three children.

G11
Frost equally a cake with 21 pieces with each of three colors of frosting.

N33
Share $78 fairly among three children.

Basic Facts and Mental Arithmetic

(From UPG I)

G3
1/2 + 1/2 = 1

1/2 x 26 = 13

N16
2 x 1/2 = 1

G7
1/2 x 60 = 30

G12
1/2 x 32 = 16

G13
1/3 + 1/3 + 1/3 = 1

1/4 + 1/4 = 1/2

(From UPG II)

N2
1/2 x 30 = 15

N3
1/2 x 20 = 10

W2
1/2 x 48 = 24

N10
Determine which number is exactly halfway between 0 and 7 on a number line.

N11
1/2 x 30 = 15

N13
1/2 x 26 = 13

W8
1/2 x 50 = 25

N19
1/2 x 300 = 150

N20
1/2 + 1/2 = 1

W13
1/2 x 22 = 11

N27
1/3 x 15 = 5

G10
1/2 x 8 = 4

N29
1/3 x 6 = 2

N33
1/4 x 100 = 25

N35
3 1/2 = 3.50

NEGATIVES

Joining Sets

(From UPG I)

W2
$7 + 6 = \hat{1}$

W3
$3 + 10 = 7$

W5
$7 + \hat{4} = 3$

W6
$\hat{3} + \hat{5} = \hat{8}$

W8
$5 + \hat{5} = 0$

W12
$\hat{5} + 3 = \hat{2}$

W17
$12 + \hat{4} = 8$

(From UPG II)

W1
$6 + \hat{2} = 4$

N15
$13 + \hat{5} = 8$

Story Problems

(From UPG I)

W2
An elephant collects peanuts in a bag. When a magic peanut is put into the bag, it causes one regular peanut in the bag and itself to disappear.

W5
An elephant collects peanuts in a bag.

W11
An elephant collects peanuts from three peanut plants.

W14
An elephant collects peanuts in a bag, and all but one of them disappear.

W17
An elephant discovers that some peanuts are missing.

(From UPG II)

W3
An elephant collects peanuts in a bag.

N15
An elephant collects peanuts in a bag.

W14
A janitor travels up and down in an elevator.

Estimation

(From UPG I)

W14
$68 + \hat{45}$

Properties

(From UPG I)

W17
$12 + \hat{4} = 12 - 4$

(From UPG II)

N15
$13 - 5 = 13 + \hat{5}$

N17
$200 - 127$
$= 200 + \hat{127}$

N21
$2.00 - 1.25$
$= 2.00 + \hat{1.25}$

NEGATIVES

Basic Facts and Mental Arithmetic

(From UPG I)

W1
Numbers less than 0 exist.

W5
$\hat{39} + 25 = \hat{14}$

W8
$\hat{1} + 100 = 99$

W9
$9 + \hat{1} = 8$

W10
$17 + \hat{2} = 15$

W11
$5 + \hat{2} = 3$

W14
$\hat{999} + 1{,}000 = 1$

N30
$0 - 3 = \hat{3}$

W17
$9 + \hat{3} = 6$

(From UPG II)

W1
$4 + \hat{8} = \hat{4}$

N4
$\hat{7} - 3 = \hat{10}$

W2
$\hat{3} + \hat{1} = \hat{4}$

W3
$8 + \hat{1} = 7$

N10
Find the number halfway between $\hat{20}$ and $\hat{10}$ on the number line.

L6
$\hat{20}$°C is colder than $\hat{5}$°C.

W6
$100 + \hat{1} = 99$

N15
$13 + \hat{5} = 8$

L8
$21 + \hat{1} = 20$

W8
$20 + \hat{1} = 19$

N17
$200 + \hat{127} = 73$

L9
$\hat{6} + 3 = \hat{3}$

N20
$\hat{2} + \hat{2} + 12 + 12 = 20$

N21
$2.00 + \hat{1.25} = 0.75$

W11
$7 - 10 = \hat{3}$

N26
$21 + \hat{1} = 20$

W13
$\hat{15} + 6 = \hat{9}$

W14
$20 + \hat{1} = 19$

N30
$\hat{3} + 3 = 0$

W16
$100 + \hat{1} = 99$

L16
40 is a multiple of 5.

W17
$\hat{4}$ is a multiple of 4.

L17
All negative numbers are less than 0.

On the Minicomputer

(From UPG I)

W5
$\hat{39} + 25 = \hat{14}$

W11
$\hat{6} + 1 = \hat{5}$

W13
$\hat{10} + 15 = 5$

W14
$68 + \hat{45} = 23$

W16
$10 + \hat{8} = 2$

W17
$95 + \hat{69} = 26$

(From UPG II)

W3
$\hat{4} + 2 = \hat{2}$

W6
$\hat{10} + 4 = \hat{6}$

N15
$100 + \hat{46} = 54$

W8
$\hat{10} + 2 = \hat{8}$

N17
$200 + \hat{127} = 73$

N21
$2.00 + \hat{1.25} = 0.75$

W13
$40 + \hat{10} = 30$

W14
$20 + \hat{1} = 19$

W16
$\hat{6{,}960} + 6{,}961 = 1$

MULTIPLES AND DIVISORS

Multiples

(From UPG I)

N2
Of 2, of 4

N4
Of 5

N8
Of 2, of 5

W4
Of 2

N10
Of 5, of 10

W6
Of 2, 3, 5

N13
Of 3, of 5

L6
Of 2, of 10

W7
Of 5

N18
Of 2, 3, 5

37 is not a multiple of 2, 3, or 5.

W9
Of 2, of 3

W10
Of 2, of 3

N22
Of 5, of 10

L11
Of 5, of 10

N24
Of 3

W12
Of 2, 3, 5, 10

W13
Of 5

N28
Of 10

W15
Of 2, of 10

N31
Of 10

N32
Of 5

W16
Of 2, of 3

W17
Of 3

(From UPG II)

W1
Of 2, 3, 10

N10
Of 2, of 3

W6
Of 11

W7
Of 2, of 5

W8
Of 10

L9
Of 2, 3, 5

W9
Of 9

L12
Of 2, of 3

W13
Of 2, of 5

W14
Of 2, 3, 5

N30
Of 3, of 5

N32
Of 10

L16
Of 2, 5, 10

W17
Of 3, 4, 5

L17
Of 2, 3, 4, 5

N36
Of 3, 4, 6, 9, 12

Common Multiples

(From UPG II)

N10
Of 2 and 3

L9
Of 2 and 5

N30
Of 3 and 5

L16
Of 5 and 10

L17
Of 2 and 4

N36
Of 4 and 6

DECIMALS

(From UPG I)

N17
100 cents is $1.00.

N23
120 cents is $1.20.

L11
26 dimes is $2.60.

(From UPG. II)

N19
1/2 x 3 = 1.5 = 1.50

N21
0.29 to 74.02

N31
0.14 to 1.00

N33
100 = (3 x 33.33) + 0.01

N35
0.09 to 2.00

PROBABILITY, STATISTICS, AND GRAPHING DATA

(From UPG II)

L6
Record and compare the daily low temperatures of St. Louis and New Orleans during January and February of 1977.

L12
Predict and record the outcome (sum) of the throw of two distinct dice.

Use a coordinate grid to show all of the possible outcomes of the throw of two distinct dice.

L14
Predict, record, and compare the outcomes (sums) of many tosses of two dice.

APPLICATIONS

(From UPG I)

W1
Determine the distance between two numbers on a number line.

W3
Find a combination of coins whose value is 7¢.

N7
Find a quick way to add 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55.

W4
Find a combination of coins whose value is 12¢.

G3
Decide how to cut various shapes in half.

N9
20¢ + 20¢ + 20¢ + 10¢ = 70¢

Find an easy way to solve a long addition problem.

L5
Find your location in a seating plan.

W6
Determine the values of various combinations of coins.

Decode a message.

G4
Measure the length of a wall with footsteps.

L6
Determine the values of various combinations of coins.

W7
Find several combinations of coins whose values are 16¢.

Decode a message.

N15
20¢ + 20¢ + 20¢ + 20¢ = 80¢

N16
Determine the number of the students' hands.

N17
5 x 20¢ = $1.00

L8
Decode a message.

W9
Find a combination of coins whose value is 8¢.

G7
Half a minute is 30 seconds.

G8
Measure the length of your desk with C-rods.

N23
30¢ + 30¢ + 30¢ + 30¢ = $1.20

L11
Determine the values of various combinations of two coins.

26 dimes = $2.60

W12
Determine the values of various combinations of coins.

Decode a message.

W13
Find several combinations of coins whose values are 21¢.

Decode a message.

N28
Determine the number the last child will say if the students count off by 10s.

W14
Count by 5s with a hand-calculator.

G10
Measure the width of a desk in centimeters with a tape measure.

L14
Find your location in a seating plan.

L15
Estimate, determine, and record the outside temperature in Celcius in a chart.

N32
Determine the number the last child will say if the students count off by 5s.

G12
Find a way to draw a closed curve with 16 of 32 dots inside.

APPLICATIONS - Continued

(From UPG I:)

N2
Determine the number of students' ears.

W1
Decode a message.

Determine the values of various combinations of six coins.

W2
Decode a message.

Find several combinations of coins whose values are 50¢.

G2
Measure objects with a 100 cm tape measure.

W4
Determine perimeters in centimeters.

G3
Recognize north, south, east, and west on a map.

N9
Ten hundred is another name for one thousand.

L5
Determine the distance between points in a tree.

W5
Determine the area in square centimeters of shapes on a grid.

L6
Determine differences between temperatures.

W6
Use a hand-calculator to count by 11s.

N14
There are seven days in a week.

108¢ is the same as $1.08.

W7
Decode a message.

G5
Measure the lengths of line segments with a 100 cm tape measure.

W8
Decode a message.

G6
Recognize north, south, east, and west on a map.

N17
Determine which bills could form $200.

$200 - $127 = $73

W9
Use a hand-calculator to count by 9s.

N19
9 dimes and 1 quarter are equal to $1.15.

L10
Determine the distance between points on a tree.

G7
Decide how to cut a circular shape into eight equal pieces.

N21
Find combinations of coins whose values are 75¢.

75¢ + 50¢ = $1.25

G9
Measure the lengths of line segments with a 100 cm tape measure.

W14
Determine the distance, in floors, between two floors in a skyscraper.

G11
Color 1/3 of a grided shape.

N31
$0.45 is 45¢.

G12
Decode a message.

Use a 100 cm tape to measure the distance between two points.

N33
Determine many combinations of bills and coins that have values of $78.

L16
Determine the values of various combinations of three different coins.

N35
$0.09 is 9¢.

G13
Find a path through a maze.

REASONING

(From UPG I)

N1
Put 12 on the Minicomputer in several ways.

N2
Determine whether 25 will be skipped when you start at 2 and count by 3s.

W1
Use clues to determine an unknown number.

L2
Use clues to identify animals in a Venn diagram.

N4
Determine whether 63 will be skipped when you start at 5 and count by 5s.

W2
Use clues to identify an unknown number.

N5
Find many ways to put 20 on the Minicomputer.

W3
Explain why 12 comes before 16 when you count by 2s.

N7
Find many ways to put 20 on a Minicomputer.

L3
Use clues to identify a student in a Venn diagram.

N8
Explain why we will never meet 20 when we start at 13 and count by 2s.

N9
Find many ways to put 10 on a Minicomputer.

L4
Determine the number of ways in which two A-blocks differ.

W5
Use clues to identify an unknown number.

N11
Determine the number of hidden dots.

W6
Use clues to identify an unknown number.

G4
Explain why it takes more of a shorter unit to measure a given length.

L6
Use clues to identify an unknown combination of coins.

N14
Find a way to go from 6 to 11 by adding 2s and subtracting 1s.

N15
Find many ways to put 12 on a Minicomputer.

L7
Describe hidden A-blocks.

N16
If $2n = n$, find n.

W8
Use clues to identify an unknown number.

N18
Recognize that 37 is in the same +2 sequence as 43.

Find many ways to put 37 on a Minicomputer.

W9
Determine whether a sequence of numbers would contain 10.

N19
Determine the number of hidden dots.

L9
Describe hidden A-blocks.

Determine the labels of unknown sets in a Venn diagram.

W10
Determine whether a sequence of numbers would contain 13.

G7
Recognize that it will take more of a smaller dot to cover the board.

N22
Try to find a winning strategy for a Nim type game.

REASONING - Continued

W11
Use clues to identify an unknown number.

Examine a problem for which there are several possible answers.

G8
Explain why it takes more of a shorter unit to measure a given length.

N23
Put 20 on the Minicomputer in several ways and describe each configuration with a number story.

L11
Use clues to identify an unknown combination of coins.

N24
Determine an operation that could generate a given sequence of numbers.

W12
Use clues to identify an unknown number.

Find a way to go from 4 to 15 by adding 1s and 2s.

G9
Explain why an irregular shape has an area of less (more) than eight squares.

N25
Determine the number of odd numbers between 0 and 40.

Find an easy way to add all of the odd numbers between 0 and 40.

L12
Describe a hidden A-block.

Determine the labels of unknown sets in a Venn diagram.

W13
Find a way to go from 20 to 32 by adding 1s and 4s.

Find several ways to put 100 on a Minicomputer.

L13
Recognize that two sets may intersect, be disjoint, or one may be a subset of the other.

N28
Determine an operation that takes 30 and produces 20.

W14
Use clues to determine an unknown number.

G10
Determine that a length of 76 white C-rods is equal to a length of 38 red C-rods.

L14
Predict how many times a permutation that moves students to another seat must be followed before everyone will be in their original position.

N30
Find a way to go from 0 to 14 by adding 5s and subtracting 3s.

W15
Use a set of numbers and a sequence of numerical relationships to make true statements.

L15
Determine the labels of unknown sets in a Venn diagram.

N32
Recognize that all of the whole numbers that end in "2" or "7" will be in the same +5 sequence.

W16
Use a set of numbers and a sequence of numerical relationships to make true statements.

N33
Recognize that twelve 10s is the same as one 100 and two 10s.

N34
Compare numbers without calculating them exactly.

REASONING - Continued

W17
Use clues to identify an unknown number.

N35
Find many ways to put 100 on the Minicomputer with exactly ten checkers.

(From UPG II)

W1
Determine an operation that takes 12 and produces 18.

Find a way to go from 5 to 21 by adding 3s and subtracting 1s.

L2
Recognize that the intersection of the sets of boys and girls is empty.

N4
Use clues to identify an unknown number.

W2
Find a way to go from 7 to 25 by adding 5s and subtracting 1s.

Find many ways to put 50 on a Minicomputer.

L3
Follow clues to identify characters in a story.

N6
Find a way to go from 0 to 24 by adding 10s and 1s.

W3
Use clues to identify an unknown number.

N7
Recognize that twelve 10s is the same as one 100 and two 10s.

L4
Describe a hidden A-block.

Determine the labels of unknown sets in a Venn diagram.

N8
Determine an operation that takes 13 and produces 32.

N9
13 is one 10 and three 1s.

N10
Use clues to identify an unknown number.

W5
Draw a shape with a perimeter of 20 centimeters and an area of more than 15 square centimeters.

N12
Find a way to go from 0 to 21 by doubling and adding 1s.

Recognize that the composition of multiplication and addition is not commutative.

W6
Use clues to identify an unknown number.

Find numbers that can be put on the Minicomputer with one positive and one negative checker.

L7
Determine which two operations can be replaced by a single operation.

W7
Find a way to go from 0 to 53 by adding 10s and 1s.

Use clues to identify an unknown number.

G5
Find a shorter path, around an obstacle, between two dots.

W8
Find a way to go from 6 to 81 by adding 10s and 1s.

Use clues to identify an unknown number.

Find four ways to put 2 on the Minicomputer.

L9
Determine that 306 is a multiple of 3.

REASONING - Continued

W9
Use clues to identify an unknown number.

Find many numbers that can be put on the ones' and tens' boards of the Minicomputer with exactly two regular checkers.

N20
Determine a and b if $a + a + b = 20$.

W10
Recognize that it is impossible to draw a path that is ten blocks long between the two given points.

L11
Determine the labels of unknown sets in a Venn diagram.

Not little is big.

W11
Use clues to identify an unknown number.

L12
Determine the sum that is most probable when two dice are thrown.

W12
Use a set of numbers and a sequence of numerical relationships to make true statements.

G9
Find a shorter path around an obstacle that is between two dots.

N25
Twelve 10s is the same as one 100 and two 10s.

L13
Determine how many students have their names on at least one of two lists.

W13
Use a set of numbers and a sequence of numerical relationships to make true statements.

L14
Discuss why a sum of 7 is the most frequent outcome of a toss of a two dice.

W14
Use clues to identify an unknown number.

Observe that all of the numbers that end in "9" or "1" are one less than a multiple of 5.

N30
Determine that 103 is not a multiple of 3.

W15
Recognize new ways to represent 0 on the Minicomputer.

N31
Determine which two of six prices have a sum of 50¢.

L15
Determine the labels of unknown sets in a Venn diagram.

N32
Go from 0 to 62 by adding 10s and 1s.

W16
Find many ways to represent 1 on a Minicomputer.

L16
Determine the labels of unknown sets in a Venn diagram.

Use clues to identify an unknown combination of coins.

N34
Recognize that it is impossible to go from 50 to 0 by doubling and adding 5s.

W17
Use clues to identify an unknown number.

N35
Use clues to identify an unknown number.

Determine which three of six prices have a sum of $2.

L17
Identify various sets that are disjoint, identical, or where one set is a subset of the other.

Determine the labels for unknown sets in a Venn diagram.

N36
Determine that 100 is not a multiple of 6.

RELATIONS AND FUNCTIONS

Representing and Interpreting

(From UPG I)

L1
"I sent a letter to you."

W2
"I am less than you."

L5
"I have your name."

L8
A message is written in a coded arrow language.

W11
"I am more than you."

L11
"I am less than you."

L14
Students change seats.

W15
"I am less than you."

W16
"I am more than you."

N34
"I am less than you."
"I am more than you."

L17
Monkeys dance.

(From UPG II)

L3
"I sent a valentine to you."

W6
"I am more than you."

L8
Create your own story.

W12
"I am more than you."

N26
Number pairs whose sum is 100

W13
"I am less than you."

L16
"is more than"
"is less than"

RELATIONS AND FUNCTIONS

Composition

(From UPG I)

N10
Adding 2 and then 3 is the same as adding 5.

L10
Yellow followed by blue is red.

N22
Adding 6 and then subtracting 1 is the same as adding 5.

W13
Adding 1 four times is the same as adding 4.

L14
Of permutations

N32
Adding 5 and then subtracting 5 returns you to your original number.

L16
Yellow followed by blue is red.

N36
Adding 10 and then subtracting 1 is the same as adding 9.

(From UPG II)

N2
Doubling twice is the same as multiplying by 4.

W1
Adding 3 twice is the same as adding 6.

N8
Adding 10 twice is the same as adding 20.

Adding 10 and then subtracting 1 is the same as adding 9.

N12
The composition of multiplication and addition functions is not commutative.

L7
Yellow followed by blue is red.

N16
Subtracting 10 four times is the same as subtracting 40.

N18
Subtracting 10 twice is the same as subtracting 20.

N22
Adding 10 and then subtracting 1 is the same as adding 9.

N24
The composition of multiplication and addition functions is not commutative.

W13
Adding 15 twice is the same as adding 30.

N28
Subtracting 10 three times is the same as subtracting 30.

N34
The composition of multiplication and addition functions is not commutative.

RELATIONS AND FUNCTIONS

Numerical Operations

(From UPG I)

N2
+2, +3, +4, -3

N4
+5, -5

N6
2x

W3
+1, +2, +3, -1, -2

N8
+5, -5, +2, -2

W4
+2, +3, +5, -1, -2, -10, 2x

N10
+2, +3, +5, +7, +10

W5
+1, +3

W6
+1, +2, +3, +5, -1, -2

L6
+10

N14
+1, +2, +3, -1, -2

W7
+3, +4, +5, +9, +10, -1, -2, -3, 2x

N16
2x

W8
+1, +3

N18
+2, +3, +5, 2x

W9
+1, +2, +3, -1, 2x

W10
+2, +3, +5, -2, -3, 2x

N22
+2, +3, +5, +6, +7, +10, -1

W11
+5

L11
+5, +10

N24
+3, -3

W12
+1, +2, +3, +5, +10, -1, -2

N26
2x, 1/2x

W13
+1, +2, +3, +4, +5, -1, -2, 2x

N28
+10, -10, +0

N30
+2, +3, +5, -1, -2, -3, -4, -5

W15
+1, +2, +10, -1, 2x

N31
+10

N32
+5, -5

W16
+2, +3, -1, -2, -4, -5, 2x

N33
+15

W17
+3

N36
+9, +10, -1

(From UPG II)

N2
2x, 1/2x, 4x, 1/4x

W1
+2, +3, +4, +6, 2x, -1, -2, -3, -10

N3
2x, 1/2 x

N4
+2, -3

W2
+1, +1, +5, +10, -1, -2, -5, 2x, 1/2x

N5
2x, 1/2x

N6
+10, +1

W3
+4

N7
+15

N8
+10, -1

N9
+13, +14

N10
+2, +3

N11
2x, 1/2x

N12
2x, +1

N14
3x

W7
+1, +2, +3, +5, +10, -1, -2, 2x

N16
+10, -10, -20, -30, -40, -3, -33

W8
+1, +5, +10, -10, 2x, 3x

L9
+3

N18
+6, +7, +10, +11, -6, -10, -11

N22
+9, +10, -1

RELATIONS AND FUNCTIONS.

Numerical Operations - Continued

W11
+4, +5, -10

N24
+10, 10x

W12
+1, +3, +5, -1,
-10, 2x, 3x

N25
+675

W13
+1 to +6, +10,
+15, +30, -1,
-3, -11, 2x,
1/2x

N27
3x, 1/3x

N28
-5, -10, -30

N30
+3, +5

N32
+1, +10, +100

N34
+1, +2, +5, 2x

W17
+3

N36
+3, +4, +6, +9

Converse

(From UPG I)

N2
+3, -3

N4
+5, -5

N8
+5, -5; +2, -2

N24
+3, -3

N26
2x, 1/2x

N28
+10, -10

N32
+5, -5

N34
"I am less than you."
"I am more than you."

(From UPG II)

N2
2x, 1/2x; 4x, 1/4x

N3
2x, 1/2x

W2
+5, -5; +1, -1

N5
2x, 1/2x

N11
2x, 1/2x

N16
+10, -10

N18
+10, -10; +6, -6;
+11, -11

N26
Number pairs whose
sum is 20

N27
3x, 1/3x

SORTING AND CLASSIFYING

(From UPG I)

L2
Animals using a Venn diagram

W2
Numbers that can be put on the Minicomputer with exactly two checkers

Odd numbers

L3
People using a Venn diagram

W4
Put a dot for 12 in a Venn diagram.

L4
A-blocks using a Venn diagram

W5
Numbers using a Venn diagram

W6
Put a dot for yourself in a Venn diagram.

W7
Animals using a Venn diagram

L7
A-blocks using a Venn diagram

W8
Numbers using a Venn diagram

W9
Put a dot for 8 in a Venn diagram.

L9
A-blocks using a Venn diagram

W10
Put a dot for 15 in a Venn diagram.

W12
Put a dot for yourself in a Venn diagram.

G9
Shapes by area

N25
Odd numbers

L12
A-blocks using a Venn diagram

W13
A-blocks using a Venn diagram

L13
Students using a Venn diagram

W14
Numbers that need at least three checkers to be shown on the Minicomputer

Numbers using a Venn diagram

W15
Odd numbers

L15
A-blocks using a Venn diagram

W16
Numbers using a Venn diagram

W17
Odd numbers

L17
Cars using a Venn diagram

SORTING AND CLASSIFYING - Continued

(From UPG II)

W1
Children using a Venn diagram

L2
Students using a Venn diagram

N4
Even and odd numbers by counting by 2s

W2
Numbers using a Venn diagram

W3
Numbers using a Venn diagram

L4
A-blocks using a Venn diagram

N10
Even numbers

W6
Not even numbers

W7
Numbers using a Venn diagram

W8
Numbers using a Venn diagram

L9
Numbers using a Venn diagram

W9
Numbers using a Venn diagram

L10
Even and odd numbers

L11
A-blocks using a Venn diagram

W11
Numbers using a Venn diagram

L12
Even and odd numbers

W12
Numbers using a Venn diagram

L13
Children using a Venn diagram

W13
Numbers using a Venn diagram

L14
Even numbers

W14
Numbers using a Venn diagram

N30
Numbers using a Venn diagram

L15
A-blocks using a Venn diagram

L16
Numbers using a Venn diagram

W17
Numbers using a Venn diagram

L17
Even and odd numbers

N36
Numbers using a Venn diagram

PATTERNS

(From UPG I)

N3
2, 20, 200

N4
The one's digits alternate when counting by 5s.

N5
4 + 5 = 9; 40 + 50 = 90;
400 + 500 = 900

N6
A 4-by-4-by-4 dot array

N8
All the numbers are odd when you start counting by 2s with an odd number.

N11
A 3-by-4 dot array

N12
In a sequence of problems

N13
A 3-by-5 dot array

W7
In a sequence of problems

N16
In a sequence of problems

G6
All round trips on a grid have an even length.

N17
12; 120; 1,200; 12,000

W9
All the numbers are even (odd) when counting by 2s.

N19
A 4-by-7 array of dots

N20
In a sequence of problems

N21
In a sequence of problems

W12
In a sequence of problems

N25
12; 120; 1,200; 12,000

N27
A 4-by-9 dot array

N28
Counting by 10s

W14
The ones' digits alternate when counting by 5s.

L14
In lists of names

G11
A 5-by-5 dot array

N31
20; 200; 2,000; 20,000

N32
Counting by 5s

N35
40; 400; 4,000; 40,000

N36
7 + 10 = 17 so 7 + 9 = 16

PATTERNS - Continued

(From UPG II)

L1
There is only one path between two points on a tree.

N3
A 4-by-2 dot array

N4
Counting by 2s

N6
Two digit numerals whose digits have a sum of 7

G3
An arrangement of dots on a grid

N10
Counting by 2s on a number line

W6
Counting by 11s

G4
An 8-by-8 array of rectangles

N13
In a sequence of problems

N15
Multiplying by 10

G6
An arrangement of dots on a grid

N17
Multiplying by 10

L9
Counting by 3s

W9
Counting by 9s

N19
1/2 x 300 = 150; 1/2 x 30 = 15; 1/2 x 3 = 1.5

N20
Sums of 10

W10
An arrangement of dots on a grid

N22
Recognize arrows that alternate in color and orientation in space.

W11
Counting by 10s

N24
Multiplying by 10

N27
A 4-by-3 dot array

L14
Sums of 7

N28
The one's digit alternates when counting by 5s.

W14
The one's digit of an even number is either 0, 2, 4, 6, or 8.

N30
The one's digit alternates when counting by 5s.

N33
100 ÷ 3 results in a repeating decimal.

NETWORKS

(From UPG II)

L1
Trees

L5
Trees

L10
Trees

G13
Mazes

TAXI-GEOMETRY

(From UPG I)

G2
Find long paths between points on a grid.

G6
Find the shortest path between two points on a grid.

G11
Find all of the points on a grid that are a four-block walk from a starting point.

(From UPG II)

G3
Find all of the points with a shortest distance of five blocks from a starting point.

G6
Find all of the points with a shortest distance of six blocks from a starting point.

W10
Find all of the points that are equidistant from two given points.

TRANSFORMATIONAL CONCEPTS

(From UPG I)

G3
Determine which letters of the alphabet have lines of symmetry.

W7
Determine whether a line divides a letter into symmetric parts.

G13
Decide how to cut shapes so that all parts will look the same.

(From UPG II)

W7
Decide how to cut shapes so that all parts will look the same.

G7
Decide how to cut a shape so that all parts will look the same.

MEASUREMENT

Area

(From UPG I)

G1
Color shapes with an area of ten squares.

W3
Find a shape on a grid with an area of seven squares.

W4
Find a shape on a grid with an area of twelve squares.

G3
Compare the resulting areas after a shape is cut once.

W6
Determine the areas of shapes on a grid.

G5
Estimate, compare, and determine the areas of shapes by covering them with triangles or squares.

W9
Find a shape on a grid with an area of eight squares.

W10
Draw a shape on a grid with an area of 15 squares.

G7
Cover areas with tangrams.

G9
Measure and compare the areas of various shapes to a shape with an area of eight squares.

G13
Compare the resulting areas after a shape is cut twice.

(From UPG II)

W1
Compare the areas of various shapes.

G1
Estimate and compare the areas of various shapes to a shape with an area of eight squares.

W4
Draw shapes with an area of 18 square centimeters.

W5
Draw shapes with an area of 16 square centimeters.

G4
Compare the areas of congruent triangles.

G8
Identify all the shapes with an area of 1 1/2 squares.

G10
Compare and measure the areas of a triangle, square, and parallelogram.

MEASUREMENT

Length

(From UPG I)

W1
Determine the distance between two points on a number line.

G2
Compare and determine the lengths of paths on a grid.

W4
Find a path on a grid with a length of twelve blocks.

G4
Estimate, compare, and measure the length of a wall with various shoe lengths.

G6
Compare and determine the lengths of paths on a grid.

W9
Find a path on a grid with a length of eight blocks.

W10
Draw a path on a grid with a length of 15 blocks.

G8
Estimate, measure, and compare the length of your desk with C-rods of various lengths.

G10
Estimate and measure the width of a desk in centimeters.

G11
Find paths on a grid with a length of four blocks.

(From UPG II)

W2
Compare the lengths of lines on a grid.

G2
Estimate and measure the lengths of various objects in centimeters.

W4
Determine and compare the lengths of the borders of various shapes in centimeters.

G3
Compare and determine the lengths of paths on a grid.

N10
Determine the distance between 13 and 8 on a number line.

W5
Draw a shape with a border that is longer than 24 centimeters.

G5
Estimate and measure the length of a zigzag path in centimeters.

G6
Compare and determine the lengths of paths on a grid.

W10
Measure and compare the lengths of paths on a grid.

G9
Estimate and measure the length of a zigzag path in centimeters.

G12
Estimate and measure the distance between two points in centimeters.

EUCLIDEAN CONCEPTS

Shapes

(From UPG I)

G1
Squares and triangles

L4
A-blocks

W6
Squares

G5
Squares and triangles

L7
A-blocks

L9
A-blocks

G7
Tangrams

G9
Squares, rectangles, and triangles

L12
A-blocks

W13
Circles

L15
A-blocks

G12
Squares

(From UPG II)

G1
Rectangles, squares and triangles

L4
A-blocks

G4
Tangrams

G7
Squares

L11
A-blocks

G8
Squares and triangles

L12
The face of a cube is a square.

G10
Tangrams

G11
Squares

L15
A-blocks

Directions

(From UPG II)

G3
North, south, east, and west on a map

G6
North, south, east, and west on a map

THIRD GRADE

COUNTING AND COMBINATORICS

Counting Objects

(From UPG III)

W1
Arrows

N3
Checkers

N4
Arrows

W2
Arrows

G1
Squares

L3
Dots

W3
Floors of a building

G2
Blocks on a grid

N8
Arrows

W4
Squares

G4
Squares

N14
Arrows

G5
Squares

L8
Marbles

G7
Blocks on a grid

G8
Blocks on a grid

W12
Checkers

G9
Parts of a whole

W13
Squares on a grid

L14
Marbles

N28
Arrows

W14
Squares on a grid

L15
Movements in a permutation

G11
Squares on a grid

G12
Paths on a map

N34
Dots

N36
Arrows

W18
Arrows

G13
Campsites on a map

(From UPG IV)

L1
Dots

N2
Dots

G1
Blocks on a grid

N6
Arrows

L4
Dots

N8
Arrows

G3
Blocks on a grid

N9
Presses of a button

G4
Dots

L7
Outcomes

N14
Arrows

W8
Checkers

G6
Blocks on a grid

N19
Checkers

G7
Doors of a house

G8
Squares on a grid

G9
Doors of a room

N26
Arrows

L13
Outcomes

G10
Square corners

N30
Arrows

G11
Squares on a grid

N31
Arrows

N34
Arrows

W17
Arrows

G13
Squares on a grid

COUNTING AND COMBINATORICS

Skip Counting

(From UPG III)

N2
By 2s, 4s, and 5s

W1
By 2s to 10s

N4
By 2s, 3s, 5s, and 7s

W2
By 2s to 100s

N6
By 10s with a hand-calculator

W3
By 5s, by 10s

N7
By 5s, by 100s

L4
By 3s, by 4s with a hand-calculator

W4
By 2s, 5s, and 10s

N10
By 3s, 5s, and 10s

W5
By 5s, 7s, 9s, and 10s

N12
By 2s

W6
By 3s, by 10s

N14
By 10s

W7
By 2s to 18s

N18
By 4s with a hand-calculator

W9
By 11s

N20
By 4s, by 5s

N22
By 2s

W11
By 3s, 4s, and 5s

N24
By 3s

W13
By 2s, 3s, 4s, and 10s

W14
By 4s, by 5s

W15
By 3s, 4s, and 5s with a hand-calculator

W16
By 2s to 10s

N33
By 100s

L17
By 2s

W17
By 5s, by 15s

W18
By 5s

(From UPG IV)

L1
By 3s, 5s, and 15s

N2
By 3s

W1
By 2s, 4s, 5s, and 10s

W2
By 2s, 3s, and 4s

L4
By 2s, 4s, 6s, and 12s

W4
By 3s, 4s, and 10s

G3
By 4s

L5
By 2s, by 3s

W5
By 3s, by 4s

G6
By 2s, 3s, and 4s

W9
By 10s

N19
By 5s, by 10s

W10
By 3s, by 4s

W11
By 2s, 3s, and 5s

G8
By 2s, by 10s

N23
By 2s to 8s

W12
By 2s, 3s, and 10s

W13
By 4s

L14
By 5s

W15
By 5s, by 10s

W16
By 2s, 4s, and 15s

COUNTING AND COMBINATORICS

Counting

(From UPG III)

N20
From $\hat{8}$ to 27

L17
From 0 to 39

(From UPG IV)

W1
From 197 to 203

N6
From 120 to 127

N8
From 20 to 25

N14
From 110 to 115

W9
From 997 to 1,003

(From UPG III)

N2
By 5s

W1
By 2s to 15s

From 29 to 2

W2
By 3s to 25s

W3
By 10s

L4
By 3s

N8
By 5s

W4
By 2s

From 40 to 7

W5
By 3s, 4s, and 5s

N12
By 10s

W6
By 4s

From 102 to 98

W7
By 2s

N18
By 4s

Counting Backward

N20
By 4s

N22
By 10s

N26
By 10s

W13
By 2s

From 112 to 88

W14
By 3s, 5s, and 10s

N30
By 10s

N32
By 10s

From 43 to 39

N36
By 10s, by 100s

From 242 to 237

(From UPG IV)

N1
By 22s

W1
By 3s, by 10s

N4
By 5s, by 10s

W2
By 4s, 10s, and 100s

N7
From 3 to $\hat{4}$

N8
From 30 to 25

W4
By 10s

N14
From 510 to 507

N16
By 10s, by 100s

N17
By 7s

W9
By 10s

N21
By 15s

W12
By 5s, by 10s

N25
From 600 to 594

N26
From 30 to 25

N27
By 4s

N30
By 8s

W15
By 2s, by 4s

COUNTING AND COMBINATORICS

Combinatorics

(From UPG III)

N4
Find all of the possible ways to put 25¢ postage on a letter using 2¢ and 3¢ stamps.

N8
Find all of the possible scores after four games of checkers.

L10
Find all of the numbers that can be put on the Minicomputer with one positive checker on the tens' board and one negative checker on the ones' board.

Find all of the numbers that result from starting with 3, doubling twice, and adding 3 twice.

L12
Determine all of the possible sums of three addends that are either 4 or 2.

(From UPG IV)

L2
Find all of the numbers that can be represented using a given set of numerals and operation symbols.

W3
Find all of the numbers that can be put on the ones' board of the Minicomputer with one (10)-checker and one regular checker.

L7
Find all of the numbers that can be represented using a given set of numerals and operation symbols.

W9
Find all of the numbers than can be put on the Minicomputer by removing one of a given set of checkers.

W11
Find all of the numbers than can be put on the Minicomputer by removing two of a given set of checkers.

W13
Find all of the numbers that can be put on the Minicomputer by moving one of a given set of checkers.

L13
Find all of the numbers that can be represented using a given set of numerals and operation symbols.

L14
Find all of the possible statements (true or false) that can be made using given sets of numerals and relation symbols.

60

NUMERATION AND PLACE VALUE

Numeral Recognition

(From UPG III)

N1
7 to 93

W1
0 to 48

N3
496

W2
1 to 750

N5
59 to 625

N6
0 to 127 on a hand-calculator

N7
300 to 1,100

L4
15 to 78 on a hand-calculator

W4
0 to 1,000

G3
0 to 100

N10
18 to 243

W5
0 to 1,001

W6
21 to 605

W7
86 to 1,356

N15
100 to 248

W8
200 to 200

N17
48 to 473

L9
12 to 1,001

W9
0 to 209 on a hand-calculator

N19
1/3

W10
23 to 400

N21
72 to 38

N22
6 to 214

W11
6 to 57

N24
1 1/3

G9
1/2, 1/4, 1/8, and 1/16

N25
0.70 = 0.7

L13
9 to 100

N26
35 to 214

W13
2 to 4,108

N27
0:4 to 21.48

W14
20 to 5,928

N29
36 to 5,084

W15
0 to 43 on a hand-calculator

N31
66 to 275

L16
7 to 200

N32
39 to 503

W16
4 to 101

N33
200 to 934

L17
0 to 65,375

1/512

W17
1 to 3,000

N36
37 to 1,222

(From UPG IV)

N1
802 to 1,050

W1
101 to 200

N3
0.40 to 5.85

L2
2 to 70

W2
17 to 9,992

N5
0.52 to 124

N6
109 to 1,000

G2
32/64

N7
9 to 691

N8
5 to 100

W4
0 to 998

N9
1 to 788,544

W5
5 to 503

0.28 to 10.50

N11
5 to 100

N12
1/2 to 1,800

NUMERATION AND PLACE VALUE

Numeral Recognition - Continued

G4
5 to 108

1/5 to T/2

N13
18 to 2,551

L7
10/18

N14
2 to 1,084

W7
37 to 214

G5
1.8 to 2.7

W8
37 to 214

N17
6 to 1,738

N18
26 to 186

W9
4 to 1,003

N19
0 to 16.8

L10
2/4, 4/8, 32/64

N20
47 to 248 on a hand-calculator

W10
15 to 158

N21
14 to 7,933

N22
2 to 231

W11
16 to 53

N23
13¢ to $10.50

N24
3 to 18,750

W12
1 to 993

N25
63 to 18,217

N26
5 to 1,021

W13
5 to 995

N27
4 to 392

N29
3 to 36,000,000

N30
8 to 147

N31
18 to 486

L15
25 to 40 x 7

N32
0 to 22,270

W15
76 to 5,000

N33
1.00 to 32.25

N34
6 to 1,999

W16
80 to 1,872

1/4 to 3/4

Writing Numerals

(From UPG III)

N1
2 to 1,000

W1
1 to 42

N3
3,429

N4
0 to 50

W2
6 to 650

N5
2 to 5,936

N6
0 to 250

N7
66 to 10,171

N8
6 to 12

W4
3 to 906

G3
5 to 53

N10
4 to 253

W5
0 to 1,112

W6
21 to 605

N13
5 to 2,281

N14
0 to 129

NUMERATION AND PLACE VALUE

Writing Numerals - Continued

W7
86 to 1,356

N15
100 to 253

N16
5 1/2

N17
48 to 1,008

L9
12 to 777

L10
3 to 36

N20
8 to 27

W10
23 to 567

N21
78 to 59

N22
5 to 204

W11
0 to 54

N23
70 to 40,000

N24
1 to 78,125

G9
2/4, 4/8, 2/6, and 5/15

N26
35 to 214

W13
3 to 114

N27
1.3 to 40.3

N28
0 to 523

W14
68 to 3,557

N29
36 to 1,627

W15
5 1/2 to 28

N32
59 to 502

W16
10 to 100

L17
1,000,000

N34
0 to 1,500

W17
111 to 1,000

N36
38 to 1,221

(From UPG IV)

N1
68 to 352

N2
3 to 2,592

W1
106 to 203

W2
1 to 10,004

N5
0.26 to 62

N6
1 to 1,000

G2
5/15, 6/12

N7
14 to 403

N8
4 to 100

W4
1 to 1,014

W5
7 to 502

N11
1 to 40

N12
2.5 to 888.5

N13
18 to 2,551

N14
2 to 1,083

W7
37 to 214

G5
1.7 to 2.6

N16
352 to 650

W8
37 to 214

G6
4 to 19

N17
4 to 1,251

N18
2 to 186

W9
4 to 1,002

N19
0.15 to 1.3

W10
41 to 158

N21
10 to 5,166

N22
8 to 7,424

N24
12 to 20,000

W12
10 to 1,009

1/4, 1/3, 1/2

N25
3 to 17,608

N26
3 to 1,020

W13
9 to 995

1/8, 1/5, 1/3

0.10 to 1.30

N30
0 to 105

N31
0 to 324

N32
84 to 17,639

W15
76 to 5,000

N34
8 to 2,000

W16
80 to 1,872

NUMERATION AND PLACE VALUE

Place Value

(From UPG III)

N1
1,000s; 100s; 10s; and 1s

N3
1,000s; 100s; 10s; and 1s

N5
1,000s; 100s; 10s; and 1s

N7
Hundreds, tens, and ones

N13
1,000s; 100s; 10s; and 1s

N14
Tens and ones

N17
Hundreds, tens, and ones

N19
Hundreds, tens, and ones

W10
Hundreds, tens, and ones

N21
Tens and ones

N24
Hundreds, tens, and ones

N25
Dollars, dimes, and pennies

N27
Ten dollars, dollars, dimes, and pennies

N29
Tens and ones

N31
Hundreds, tens, and ones

N32
Tens and ones

N33
Hundreds

(From UPG IV)

N2
Tens and ones

N3
Ten dollars, dollars, dimes, and pennies

N4
Tens and ones

N5
Ten dollars, dollars, dimes, and pennies

N7
Tens and ones

L5
Tens and ones

W5
Dollars, dimes, and pennies

L6
Tens and ones

G5
Decimeters and centimeters

N16
Hundreds, tens, and ones

N17
Hundreds, tens, and ones

N19
Dollars and dimes

W10
Tens and ones

N21
Hundreds, tens, and ones

L11
Tens and ones

N25
1,000s; 100s; 10s; and 1s

N26
1,000s; 100s; 10s; and 1s

W13
Tens

N29
Hundreds, tens, and ones

N32
1,000s; 100s; 10s; and 1s

L17
Tens and ones

NUMERATION AND PLACE VALUE

Representing Numbers on the Minicomputer

(From UPG III)

N1
1 to 8,000

N3
8 to 3,429

N5
45 to 5,936

N7
47

W4
3 to 1,000

N9
89 to 154

W5
20 to 1,112

N11
1,978

W6
21 to 90

N13
5 to 1,000

W7
37 to 76

N15
100 to 253

W9
11 to 99

N19
27 to 582

L10
2 to 79

N21
4,182 to 4,182

N23
80 to 4,000

W12
37

N25
1.15

W13
7 to 4,108

N27
0.4 to 75.00

W14
68 to 100

N29
38 to 99

W16
10 to 100

N33
167

N34
4 x 17

W17
111 to 1,000

N35
7 to 1,100

(From UPG IV)

N1
400 to 824

N2
6 x 25

W1
57 to 800

N3
0.90 to 2.15

W2
0.79 to 8.60

17 to 696

N5
66.66... to 200

W3
10 to 100

N7
433 to 691

W4
30 to 250

W5
0.26 to 20.06

N15
30 to 200

W8
37 to 214

W9
9 to 100

N19
0.1 to 16.80

W10
41 to 200

N22
2 x 28,
4 x 28,
8 x 28, and 28

W11
31 to 51

N24
24, 5 x 24, and
10 x 24

W12
10 to 999

N25
3 x (200 + 2)

N26
10 x 65

W13
7 to 200

N27
4 x (100 + 2)

L13
8 to 22

W14
79 to 79

N29
5 x 4,000

W15
76 to 200

N35
4 to 400

ORDER

Comparing Numbers

(From UPG III)

N3
To 3,429

Change one of the addends of a sum and determine whether the number is now larger, the same, or smaller than before.

100 is 60 more than 40.

G1
17 and 17

N6
n and n + 10

W3
36 is 10 more than 26.

G2
14 and 12

N7
278, 436, and 129

N8
2 is 5 more than $\hat{3}$.

W4
5 to 1,000

G3
66 is 101 less than 167.

N10
n + 3 and n

W5
To 10 and 20

N11
To 989

L6
To 50

N12
To an unknown number on a number line

W6
n, n + 10, n - 1, and 3n

To 0

N13
5 to 1,000

W7
n, n + 3, n - 10, and 2n

To 100

N15
69 < 100

L8
3 is 2 less than 5.

N16
n, 2n, and n - 1

W8
200 to 200

N17
639 < 647

787 is 13 less than 800.

L9
To 100

N18
21 is 1 more than 20.

W9
To 120

N19
To 126

L10
To 25

N20
$\hat{7}$ is ? more than $\hat{8}$.

W10
270 is 38 more than 232.

L12
$\hat{5}$ and $\hat{6}$

N24
108 and 3 x 40

W12
30 is 7 less than 37.

N26
n and n - 10

W13
To 10

N27
75¢ + 85¢ and $2

To 7.21

L14
113 is 6 more than 107.

N28
To 8

66

ORDER

Comparing Numbers - Continued

W14
To 15

n - 3 - 3 - 3 and
n - 5 - 5 - 5

G10
106 is 6 more than 100.

N30
n - 10 and n

N31
501 < 514

484 is 16 less than
500.

W16
To 20

G12
To 13

N33
336 - 167 and 200

L17
48 and 0

W17
n, n + 15, n - 8, and
2n

To 100

N35
7 to 1,100

N36
2 x 178 and 232

W18
n + 5 and n

(From UPG IV)

W1
5 to 20

n, n + 2, and n + 5

N3
$0.90 to $5.00

N4
n and n - 1

W2
To an unknown number

309, 390, 903, and 930

G1
4 is 1 less than 5.

N5
1/3 x 135 < 49

$199.98 is 2¢ less
than $200.

N6
109 to 1,000

W3
To 80 and to 30

W4
To an unknown number

N9
To 88,888

N10
n + 5 - 8 + 1 + 12 and
n + 10

W5
To 100 and 130

N11
To 100

60 is 3 less than 63.

N12
1/2 x 536 and 300

400 is 136 less than
536.

W6
To 5,000

n, n + 2, and n + 3

G4
13 is 1 less than 14.

G4
1/2 and 1/3

N13
100 ÷ 3 > 25

L7
To 13

N14
40, 48, and 50

W7
n, 2n, and n + 7

G5
To 1.8 decimeters

N15
Change one of the
addends in a sum and
determine how much
more or less the
number is than before.

100 is 99 more than 1.

ORDER

Comparing Numbers - Continued

L8
83 is 7 less than 90.

N16
n, n - 20, and n - 100

G6
4 to 19

L9
To 50

N18
1/3 x 108 and 40

90 is 18 less than 108.

W9
To 10

N19
0 to 1.3

W10
Change one of the addends in a sum and determine how much more or less the number is than before.

20 is 18 more than 2.

4 1/2, 6 1/2, and 8 1/2

N21
0 tens and 2 tens

W11
To 31 and 48

G8
120 is 20 more than 100.

N23
$9.60 is $0.90 less than $10.50

W12
To an unknown number on a number line

N25
92 is 8 less than 100.

n and n + 256

N26
70, 77, and 80

W13
To 20 and 40

Change one of the addends in a sum and determine how much more or less the number is than before.

L13
To 25 and 15

N28
7 x 5 and 30

W14
$\hat{7}9$ to 79

2 x 19 and 50

N29
148 is 2 less than 150.

L14
15 and 25

N30
130 is 17 less than 147.

L15
To 50

N32
30 is 4 more than 26.

W15
$\hat{1}6$, 0, and 9

n, n - 10, 3n, and n + 8

N33
$20 is $3.50 more than $16.50.

W16
36, 36 - 9, 9 - 36, 36 + 9, and 36 x 9

N35
$\hat{2}$ is 6 more than $\hat{8}$.

Change one of the addends in a sum and determine how much more or less the number is than before.

W17
n, n + 2, and n + 3

To an unknown number on a number line

68

ORDER

Number Line

(From UPG III)

W3
3 to 5

N7
300 to 1,100

G3
100 cm tape measure

W4
49 to 113

W5
105 to 1,002

N12
8 to 200

W8
200 to 200

N22
10 to 40

W13
59 to 114

W14
22 to 3

N33
200 to 600

L17
0 to 16 (fractions)

(From UPG IV)

W1
106 to 203

W2
900 to 1,100

G2
0 to 1 (fractions)

N7
9 to 9

W4
106 to 1,100

N9
10.25 is between 10 and 11 on the number line.

L8
35 to 30

W9
4 to 1,003

N19
0 to 1.30

L10
0 to 4 (fractions)

2/4 is halfway between 1/4 and 3/4.

W12
0 to 1 (decimals)

W13
0 to 1.30 (decimals)

W17
0 to 10 (decimals)

Comparing Sets

(From UPG III)

W1
Of 2 and 5 elements

N4
Of 9 and 12 elements

W2
Of 1 and 3 elements

G5
Of 25 and 16 squares

W12
To a set of 5 elements

(From UPG IV)

N8
To a set of 3 elements

G4
Of 9 and 8 elements

W8
Of 1 and 214 elements

G10
To a set of 12 elements

Story Problems

(From UPG III)

N7
Examine the results of an election.

ADDITION

Story Problems

(From UPG III)

N4
Use 2¢ and 3¢ stamps to put 25¢ postage on a letter.

L3
Two children have made lists of friends to invite to a party.

W3
A child travels up in an elevator making several stops.

G2
A child walks from home to the post office and store before returning home.

N7
Students vote to choose a picnic site.

N8
A child gains 3¢ when he wins a game of checkers and forfeits 2¢ when he loses a game.

G3
A bug walks along a zigzag path to food.

W8
Play a spinner game.

N17
Plan trips using a road map that indicates distances in kilometers.

W9
Obtain a score of 100 in a spinner game.

W10
Plan trips using a road map that indicates distances in kilometers.

N27
Purchase six Christmas ornaments.

N31
Plan trips using a road map that indicates distances in kilometers.

(From UPG IV)

N3
Make purchases at a stationery store.

W5
Purchase two candles for exactly $8.

G5
Determine the length of a walk between houses.

W9
A child receives money from two grandparents.

W10
Purchase two models for exactly $3.

ADDITION

Basic Facts and Mental Arithmetic

(From UPG III)

N1
800 + 200 = 1,000

N2
83 + 20 = 103

W1
19 + 4 = 23

N3
(3 x 4) + 4 + (2 x 2) = 20

N4
16 + 9 = 25

W2
25 + 5 = 30

N5
180 + 12 = 192

L3
8 + 6 = 14

N6
92 + 30 = 122

W3
45 + 10 + 5 = 60

N7
8 + 6 + 9 = 23

L4
9 + 3 + 3 + 3 + 3 = 21

N8
4 + 3 = 7

W4
2 + 9 = 11

G3
26 + 26 = 52

N9
100 = 80 + 20

N10
39 + 5 = 44

W5
27 + 9 = 36

N11
(2 x 40) + 20 + (2 x 4) + 2 = 110

W6
15 + 6 = 21

N13
8 + 4 = 12

N14
6 + 3 = 9

W7
43 + 36 = 79

N15
100 + 50 + 10 + 5 = 165

N16
100 + 14 = 114

W8
0 + 50 + 50 + 10 + 5 = 115

N17
5 + 9 = 14

N18
17 + 4 = 21

W9
99 + 11 = 110

N19
40 = 20 + 20

L10
24 + 3 = 27

N20
22 + 4 = 26

W10
5 + 7 = 12

N21
150 + 15 = 165

L12
4 + 4 + 4 = 12

W12
2 + 5 + 6 + 7 + 8 + 9 = 37

W13
37 + 10 = 47

N27
0.75 + 0.85 = 1.60

L14
4 + 2 = 6

N28
100 + 60 = 160

W14
48 + 8 = 56

G10
5 + 5 + 0 = 10

N29
8 + 3 = 11

W15
62 + 10 + 10 = 82

N31
7 + 2 + 3 + 0 + 9 = 21

L16
2 + 5 + 3 = 10

W16
19 + 3 = 22

L17
38 + 30 = 68

N34
11 + 11 + 11 + 11 = 44

W17
175 + 15 = 190

W18
184 + 100 = 284

(From UPG IV)

N1
400 + 24 = 424

N2
36 + 36 = 72

W1
Complete an addition table. Example: "9 + 7 = 16."

N3
1.25 + 0.90 = 2.15

L2
(3 + 4) x 5 = 35

ADDITION

Basic Facts and Mental Arithmetic - Continued

W2
9,998 + 2 = 10,000

N5
6 + 6 + 6 = 18

N6
3 + 3 + 4 = 10

W3
(10 x 8) + 8 = 88

N8
24 + 1 = 25

W4
Complete an addition table. Example: "9 + 20 = 29."

N9
(38 + 3 + 3) ÷ 2 = 22

L5
7 + 6 = 13

N10
44 + 10 = 54

W5
Complete an addition table. Example: "2 + 10 = 12."

N11
32 + 20 = 52

L6
⊕ sums of 5

N12
300 + 25 + 4 = 329

W6
9 + 15 = 24

N13
63 + 5 = 68

L7
Complete an addition table. Example: "10 + 7 = 17."

N14
1,080 + 1 = 1,081

W7
37 + 7 = 44

N15
57 + 18 = 75

N16
650 + 2 = 652

W8
(5 x 7) + 2 = 37

N17
2,453 + 203 = 2,656

N18
50 + 10 + 4 = 64

W9
(2 x 25) + (2 x 10) + 2 = 72

L10
16 + 16 - 32 = 0

N20
(10 x 3) + 6 = 36

W10
57 + 18 = 75

N21
446 + 53 = 499

N22
40 + 24 = 64

W11
0 + 10 + 10 + 10 - 1 = 29

G8
Sums of 40

N23
24 + 24 + 24 = 72

L11
⊕ sums of 1

N24
200 + 60 = 260

W12
999 + 2 = 1,001

N26
1,020 + 1 = 1,021

W13
0 + 50 + 20 + 5 + 1 = 76

N27
4 + 10 = 6

L13
Complete an addition table. Example: "5 + 11 = 16."

N28
10 + 2 + 2 = 14

N29
6 + 6 + 6 = 18

L14
17 + 5 + 5 + 5 + 5 = 37

N30
96 + 8 = 104

G11
20 + 30 = 50

N31
4 x 3 + 8 + 2 = 22

W15
9 + 8 = 17

N33
55 + 55 + 55 = 115

N34
1,010 + 1 = 1,011

W16
63 + 29 = 92

N35
165 + 390 = 555

L17
⊕ sums of 6

W17
52 + 40 + 30 = 122

G13
18 + 18 = 36

ADDITION

Joining Sets

(From UPG III)

N4
2 + 7 = 9

G1
12 + 3 = 15

L3
Of 3, 4, and 3 elements

G2
5 + 7 = 12

N8
5 + 6 = 11

G4
12 + 12 + 12 = 36

On the Minicomputer

(From UPG III)

W12
21 + 10 + 6 = 37

N25
(9 x 10¢) + 25¢ = $1.15

N27
0.62 + 0.45 + 1.76 + 1.09 + 0.99 + 2.30 = 7.21

Estimation

(From UPG III)

N3
Number on the Minicomputer

N7
278 + 436 + 129

L6
48 + 8

W6
287 + 318

N17
314 + 333

N27
0.62 + 0.45 + 1.76 + 1.09 + 0.99 + 2.30

N31
Choose numbers that have a sum of approximately 500.

(From UPG IV)

N3
1.25 + 0.90

W5
1.15 + 1.75

W10
1.53 + 3.97

W16
44 + 12

Properties

(From UPG III)

N14
5 + 1 + 1 + 10 + 10 + 10 = 5 + 10 + 10 + 10 + 1 + 1

(From UPG IV)

L2
4 + 3 = 3 + 4

L5
8 ⊕ 2 = 2 ⊕ 8

G8
2 + 4 + 6 + ... + 18 + 20 + 10 = (2 + 18) + (4 + 16) + (6 + 14) + (8 + 12) + (10 + 10) + 20

L11
5 ⊕ 6 = 6 ⊕ 5

G11
28 + 22 + 28 + 22 = (2 x 28) + (2 x 22)

L17
2 ⊕ 4 = 4 ⊕ 2

W17
99 + 70 = (100 + 70) - 1

ADDITION

Vertical Format and Algorithm

(From UPG III)

N5
3,000
500
60
+ 7
3,567

N7
278
436
+129
843

W4
512
+329
841

G3
16
24
21
38
+ 42
141

N11
989
+ 989
1,978

W6
153
+ 99
252

G4
18
+18
36

N13
328
+364
692

N16
50
+ 7
57

N17
56
48
261
+285
650

N19
175
175
+175
525

W10
125
+ 27
152

N24
108
108
+108
324

1 1/3
1 1/3
+1 1/3
4

N27
0.62
0.45
1.76
1.09
0.99
+2.30
7.21

W14
4,351
+ 649
5,000

G10
25
15
+10
50

N29
98
98
98
+ 98
392

N31
117
92
103
80
+109
501

L16
24
12
+14
50

N34
11
11
11
+11
44

(From UPG IV)

N2
12
12
12
12
12
+12
72

W1
16
16
+16
48

N3
1.10
1.75
+2.15
5.00

W2
154
+
191

N5
49
49
+ 49
147

W5
1.34
+2.66
4.00

N12
187 1/2
+187 1/2
375

187.5
+187.5
375.0

N13
36
36
+ 36
108

G5
5.7 dm
+ 7.4 dm
13.1 dm

N18
64
64
+ 64
192

W10
1.34
+2.66
4.00

N22
160
+ 64
224

W13
273
+127
400

N29
300
120
+ 24
444

L14
15
+25
40

N30
26
26
26
26
26
+ 17
147

G11
298
+148
446

N33
5.50
5.50
+ 5.50
16.50

MULTIPLICATION

Repeated Addition

(From UPG III)

N2
30 + 2 + 2 + 2 + 2 + 2
= 30 + (5 x 2)

N4
2 + 2 = 2 x 2

N6
n + 10 + 10 + 10 =
n + (3 x 10)

W3
5 + 5 + 5 + 5 + 5 =
5 x 5

N10
3 + 3 + 3 = 3 x 3

N11
989 + 989 = 2 x 989

G4
12 + 12 + 12 = 3 x 12

G5
3 + 3 + 3 = 3 x 3

N16
2 x 134 = 134 + 134

N19
3 x 175 = 175 + 175 +
175

N24
3 x 108 = 108 + 108 +
108

W13
+ 4 + 4 + 4 + 4 + 4 =
5 x 4

N29
3 x 99 = 99 + 99 + 99

W16
10 + 10 = 2 x 10

N34
7 + 7 = 2 x 7

W18
Twenty +5s = 20 x 5

(From UPG IV)

N2
8 + 8 + 8 = 3 x 8

W1
18 + 18 + 18 = 3 x 18

N5
42 + 42 + 42 = 3 x 42

N12
268 + 268 = 2 x 268

W6
15 + 15 = 2 x 15

N13
33 1/2 + 33 1/2 +
33 1/2 = 3 x 33 1/2

N18
36 + 36 + 36 = 3 x 36

N22
28 + 28 = 2 x 28

G8
1 + 1 = 2 x 1

N23
24 + 24 + 24 = 3 x 24

N24
24 + 24 + 24 + 24 + 24
= 5 x 24

N25
198 + 198 + 198 =
3 x 198

N27
79 + 79 = 2 x 79

N29
247 + 247 = 2 x 247

G11
28 + 22 + 28 + 22 =
2 x (28 + 22)

N33
3 x 11 = 11 + 11 + 11

W16
36 + 36 + 36 + 36 + 36
+ 36 + 36 + 36 + 36 =
9 x 36

G13
3 + 3 + 3 = 3 x 3

MULTIPLICATION

Story Problems

(From UPG III)

W3
A "+5" button is pushed five times.

(From UPG IV)

N5
Three children are each given $66.66.

N23
Purchase paint brushes in quantities.

N32
48 eggs will fill four egg cartons.

N33
Purchase petunias in quantities.

Estimation

(From UPG III)

N3
2 x 496

L6
9 x 11

L9
3 x 17

(From UPG IV)

L9
4 x 17

L15
40 x 7

W16
10 x 21

Vertical Format and Algorithm

(From UPG III)

N16

$$\begin{array}{r} 134 \\ \times\ 2 \\ \hline 268 \end{array}$$

N24

$$\begin{array}{r} 324 \\ \times\ 3 \\ \hline 972 \end{array}$$

(From UPG IV)

N18

$$\begin{array}{r} 64 \\ \times\ 3 \\ \hline 192 \end{array}$$

N22

$$\begin{array}{l} 8 \times 20 = 160 \\ 8 \times\ 8 = \ 64 \\ \hline 8 \times 28 = 224 \end{array}$$

N26

$$\begin{array}{r} 65 \\ \times\ 10 \\ \hline 650 \end{array}$$

N29

$$\begin{array}{r} 247 \\ \times\ 2 \\ \hline 14 \\ 80 \\ 400 \\ \hline 494 \end{array}$$

MULTIPLICATION

Basic Facts and Mental Arithmetic

(From UPG III)

N2
2 x 600 = 1,200

W1
2 x 8 = 16

N4
3 x 7 = 21

W2
2 x 15 = 30

N5
3 x 60 = 180

N6
3 x 10 = 30

N7
5 x 40 = 200

L4
5 x 4 = 20

W4
2 x 24 = 48

N10
9 x 3 = 27

W5
3 x 45 = 135

N11
2 x 45 = 90

W6
3 x 31 = 93

G4
3 x 12 = 36

W7
2 x 64 = 128

N15
8 x 10 = 80

N16
2 x 134 = 268

N19
3 x 70 = 210

L10
2 x 18 = 36

N21
2 x 55 = 110

N23
10 x 4 = 40

N24
3 x 8 = 24

W12
(5 x 7) + 2 = 37

N25
2 x 70 = 140

N26
5 x 7 = 35

W13
7 x 4 = 28

N27
8 x 25 = 200

N28
10 x 0 = 0

W14
3 x 9 = 27

N29
2 x 39 = 78

W15
(3 x 4) + 5 = 17

W16
5 x 4 = 20

L17
8 x 2 = 16

N34
4 x 27 = 108

W17
4 x 25 = 100

N35
10 x 100 = 1,000

W18
3 x 251 = 753

(From UPG IV)

N2
6 x 12 = 72

W1
10 x 20 = 200

L2
(3 x 5) + 4 = 19

W2
3 x 36 = 108

N5
3 x 33 = 99

N6
34 x 10 = 340

W3
(10 x 8) + 7 = 87

N8
2 x 1,009 = 2,018

W4
10 x 14 = 140

G3
3 x 4 = 12

N9
8 x 8 = 64

L5
6 x 6 = 36

N10
2 x 27 = 54

MULTIPLICATION

Basic Facts and Mental Arithmetic -.Continued

W5
8 x 0.25 = 2.00

N12
2 x 260 = 520

W6
2 x 9 = 18

N13
3 x 30 = 90

L7
Complete a multiplication table. Example: "5 x 4 = 20."

N14
10 x 20 = 200

W7
2 x 107 = 214

N16
10 x 100 = 1,000

W8
8 x 11 = 88

N17
10 x 10 = 100

L9
5 x 9 = 45

N18
3 x 40 = 120

W9
5 x 8 = 40

N19
10 x 0.25 = 2.50

L10
175 x 45 x 0 x 45 x 728 x 75 = 0

N20
(10 x 3) + 6 = 36

W10
2 x 79 = 158

N21
10 x 10 = 100

N22
Complete a multiplication table. Example: "4 x 23 = 92."

W11
(4 x 10) + (3 x 2) = 46

G8
2 x 9 = 18

N23
8 x 5 = 40

L11
⊗ products of 4

N24
10 x 73 = 730

W12
Complete a multiplication table. Example: "3 x 9 = 27."

N25
3 x 195 = 585

N26
10 x 3,005 = 30,050

W13
16 x 8 = 128

N27
3 x 49 = 147

L13
Complete a multiplication table. Example: "10 x 4 = 40."

N28
7 x 10 = 70

W14
2 x 39 = 78

G10
3 x 4 = 12

N29
3 x 8,000,000 = 24,000,000

N30
5 x 26 = 130

G11
2 x 28 = 56

N31
(100 - 1) x 3 = 297

L15
5 x 11 = 55

N32
4 x 12 = 48

W15
10 x 500 = 5,000

N33
5 x 7 = 35

L16
0 x n = 0

N34
2 x 16 = 32

W16
Complete a multiplication table. Example: "7 x 6 = 42."

L17
⊗ products of 0

W17
3 x 35 = 105

G13
4 x 9 = 36

MULTIPLICATION

On the Minicomputer

(From UPG III)

N3
2 x 496 = 992

N5
4 x 260 = 1,040

W5
2 x 12 = 24

W6
3 x 10 = 30

N23
10 x 47 = 470

W12
2 x 15 = 30

N28
10 x 16 = 160

W14
10 x 10 = 100

W16
5 x 4 = 20

W17
10 x 11 = 110

N35
10 x 14 = 140

(From UPG IV)

N2
6 x 25 = 150

W1
10 x 4 = 40

N6
10 x 15 = 150

W3
10 x 8 = 80

W4
10 x 25 = 250

W8
10 x 10 = 100

W9
5 x 10 = 50

N19
10 x 1.68 = 16.80

W12
10 x 10 = 100

N26
10 x 65 = 650

W15
10 x 6 = 60

MULTIPLICATION

Properties

(From UPG III)

N5
(3 x 20) + (3 x 40) =
3 x 60

N7
5 x 47 =
(5 x 40) + (5 x 7)

N11
2 x 75 =
(2 x 70) + (2 x 5)

N19
3 x 175 = (3 x 100) +
(3 x 70) + (3 x 5)

N21
3 x 55 =
(3 x 50) + (3 x 5)

N28
10 x 16 =
(10 x 10) + (10 x 6)

N29
3 x 99 =
(3 x 100) - (3 x 1)

L17
(3 + 5) x 2 ≠
3 + (5 x 2)

N34
4 x 7 = 7 x 4

N35
10 x 14 =
(10 x 10) + (10 x 4)

W18
(3 x 40) + (3 x 2) =
3 x 42

(From UPG IV)

N2
6 x 25 =
(6 x 20) + (6 x 5)

6 x 25 = 3 x (2 x 25)

L2
(4 + 3) x 5 =
5 x (4 + 3)

W2
(6 + 5) x 2 ≠
6 + (5 x 2)

(7 - 2) x 3 ≠
7 - (2 x 3)

N6
10 x 11 = 11 x 10

11 x 10 =
(10 x 10) + 10

W5
8 x $1.25 =
(8 x $1) + (8 x $0.25)

(7 + 8) x 2 ≠
7 + (8 x 2)

N18
3 x 36 = 36 x 3

3 x 64 =
3 x (50 + 10 + 4)

N22
8 x 28 =
(8 x 20) + (8 x 8)

8 x 8 =
(10 x 8) - 8 - 8

8 x 8 =
(5 x 8) + (3 x 8)

N23
5 x 8 = 8 x 5

8 x $1.20 =
(8 x $1) + (8 x $0.20)

L11
3 ⊗ 8 = 8 ⊗ 3

N24
5 x 24 =
(5 x 20) + (5 x 4)

W12
2 x (7 + 1) ≠
(2 x 7) + 1

2 x (7 + 1) ≠
2 + (7 x 1)

N25
3 x 195 =
(3 x 200) - (3 x 5)

N27
2 x 49 = 2 x (50 + 1)

N28
7 x 14 =
(7 x 10) + (7 x 4)

G10
2 x 6 = 6 x 2

N29
3 x 148 =
(3 x 150) - (3 x 2)

2 x 247 = (2 x 200) +
(2 x 40) + (2 x 7)

G11
2 x 28 + 2 x 22 =
2 x 50

2 x 149 =
(2 x 150) - 2

L17
6 ⊗ 5 = 5 ⊗ 6

80

SUBTRACTION

Partitioning of Sets

(From UPG III)

L3
3 of 8 elements

N9
13 - 5 = 8

L8
Of 6 elements

L14
Of 6 elements

L16
12 of 36 elements

(From UPG IV)

N12
658 = 600 + 50 + 8

N13
363 = 100 + 100 + 100 + 63

Inverse of Addition

(From UPG III)

N2
5 + 20 = 25,
25 - 20 = 5

N15
100 - 69 = □,
69 + □ = 100

N16
115 + 1 = 116,
116 - 1 = 115

N17
630 + 17 = 647,
647 - 630 = 17

W15
24 + 4 = 28,
28 - 4 = 24

W18
□ + 100 = 361,
361 - 100 = □

(From UPG IV)

N10
n - 10 + 5 + 10 - 2 - 3 = n

N28
(9 x 22) + 2 = 200,
200 - (9 x 22) = 2

N30
(26 x 5) + 17 = 147,
147 - (26 x 5) = 17

Story Problems

(From UPG III)

W3
A child travels down in a faulty elevator.

N8
A child gains 3¢ when a game is won and forfeits 2¢ when a game is lost.

N9
Some peanuts are missing.

N15
Purchase a bicycle with $100.

W8
Play a spinner game.

N17
There are two possible routes between two towns.

W9
Obtain a score of 100 in a spinner game.

W10
There are three possible routes between two towns.

N27
Make a purchase with $2.

(From UPG IV)

N3
Pay for a purchase of $1.45 with $2.

N13
Some watermelons are stolen.

SUBTRACTION

Basic Facts and Mental Arithmetic

(From UPG III)

N2
871 - 20 = 851

W1
23 - 10 = 13

W2
59 - 10 = 49

W3
24 - 5 = 19

L4
78 - 3 = 75

N8
10 - 2 = 8

W4
19 - 2 = 17

W5
20 - 3 = 17

N12
106 - 10 = 96

W6
16 - 4 = 12

W7
96 - 23 = 73

N15
100 - 69 = 31

L8
9 - 2 = 7

N16
116 - 1 = 115

W8
0 - 50 - 50 - 50 - 20 = 170

N17
697 - 650 = 47

N18
100 - 4 = 96

W9
0 + 50 + 50 + 50 - 50 = 100

N21
124 - 2 = 122

N22
76 - 10 = 66

N24
21 - 3 = 18

W12
50 - 13 = 37

N26
1,000 - 10 = 990

W13
17 - 2 = 15

N27
$2 - $1.60 = $0.40

W14
102 - 10 = 92

N29
49 = 50 - 1

N30
81 - 39 = 42

W15
26 - 2 - 2 = 22

N32
141 - 100 = 41

N33
70 - 16 = 54

W17
100 - 8 = 92

N36
1,053 - 100 = 953

(From UPG IV)

N1
800 - 400 = 400

W1
Complete a subtraction table. Example: "7 - 6 = 1."

N3
$2.00 - $1.45 = $0.55

N4
94 - 37 = 57

W2
7 - (2 x 3) = 1

N7
68 - 29 = 39

N8
100 - 1 = 99

W4
81 - 10 = 71

N9
(8 - 2) ÷ 2 = 3

N10
49 - 5 = 44

W5
114 - 10 = 104

N11
1,056 - 1,049 = 7

N13
363 - 100 = 263

L7
Complete a subtraction table. Example: "10 - 7 = 3."

N14
990 - 1 = 989

W7
95 - 7 = 88

N15
210 - 10 = 200

N16
575 - 320 = 255

W8
120 - 13 = 107

N17
12 - 8 = 4

W9
61 - 9 = 52

L10
1,000 - 1,000 = 0

N20
(36 - 10) ÷ 2 = 13

W10
(3 x 5) - 4 = 11

N21
200 - 99 = 101

W11
0 + 20 + 20 + 20 - 20 = 40

W12
Complete a subtraction table. Example: "12 - 7 = 5."

SUBTRACTION

Basic Facts and Mental Arithmetic - Continued

N25
8,000 - 2 = 7,998

N26
30 - 1 = 29

W13
50 + 50 - 20 - 5 = 75

N27
80 - 4 = 76

L13
Complete a subtraction table. Example: "5 - 4 = 1."

N28
100 - 70 = 30

N29
450 - 6 = 444

N30
147 - 26 = 121

N31
11 x 5 - 6 = 49

W15
Complete a subtraction table. Example: "16 - 7 = 9."

N33
20 - 16.50 = 3.50

N34
1,010 - 1 = 1,009

W16
Complete a subtraction table. Example: "15 - 6 = 9."

N35
555 - 72 = 483

On the Minicomputer

(From UPG III)

N3
337 - 214 = 123

N9
154 - 89 = 65

(From UPG IV)

N7
68 - 29 = 39

W10
79 - 68 = 11

Estimation

(From UPG III)

N3
337 - 214

L6
72 - 24

N15
253 - 186

N22
104 - 30

N33
336 - 167

N36
232 - □ = 89

(From UPG IV)

N13
363 - n = 295

W16
9 - 36

SUBTRACTION

Properties

(From UPG III)

N30
93 - 39 = (93 - 40) + 1

N33
100 - 16 = (100 - 10) - 6

N36
200 - 110 =
(200 - 100) - 10

(From UPG IV)

N4
94 - 37 = (94 - 30) - 7

94 - 37 = (94 - 40) + 3

N7
7 - 3 ≠ 3 - 7

N11
16 - 9 =
(16 + 10) - (9 + 10)

28 - 15 =
(20 - 10) + (8 - 5)

52 - 39 = (52 - 40) + 1

N13
363 - 68 = (363 - 63) - 5

534 - 97 = 537 - 100

N16
837 - 320 =
(800 - 300) + (37 - 20)

N17
872 - 428 =
872 - 400 - 20 - 8

872 - 428 = 874 - 430

W9
10 - 7 ≠ 7 - 10

Vertical Format and Algorithm

(From UPG III)

N9
36
-12
24

N12
73
-26
47

N15
253
-186
67

N17
697
-650
47

N22
120
- 37
83

N26
185
- 46
139

N27
2.00
-1.60
0.40

N32
63
-24
39

N33
100
- 16
84

N36
232
-143
89

(From UPG IV)

N4
94
-37
57

N7
74
-55
19

N11
32
-19
13

N13
363
- 68
295

N17
872
-428
444

W9
12
- 9
3

N21
1,396
- 209
1,187

N25
300
- 12
288

W13
45
-17
28

N27
26
-18
8

N30
121
- 26
95

N32
200
- 48
152

W15
93
-46
47

84

DIVISION

Equal Partitioning of Sets

(From UPG III)

N2
1/2 x 8 = 4

G1
1/2 x 24 = 12

W4
1/2 x 14 = 7

G4
1/4 x 36 = 9

L8
1/3 x 24 = 8

N24
1/3 x 4 = 1 1/3

W13
1/2 x 22 = 11

W14
1/3 x 21 = 7

(From UPG IV)

N2
1/3 x 24 = 8

W10
1/2 x 13 = 6 1/2

N28
100 ÷ 7

N30
147 ÷ 26

On the Minicomputer

(From UPG III)

N11
1/2 x 1,978 = 989

N19
1/3 x 378 = 126

N25
1/2 x 700 = 350

(From UPG IV)

N5
1/3 x 200 = 66.66...

N24
1/2 x (10 x 24) = 120

Estimation

(From UPG III)

N11
1/2 x 1,978

L6
96 ÷ 2

N19
1/3 x 378

N24
1/3 x 108

(From UPG IV)

N5
1/3 x 135

N12
1/2 x 536

N13
100 ÷ 3

N18
1/3 x 108

N28
100 ÷ 7

N30
147 ÷ 26

DIVISION

Inverse of Multiplication

(From UPG III)

N11
2 x 75 = 150, 1/2 x 150 = 75

G4
3 x 12 = 36, 1/3 x 36 = 12

N16
1/2 x 12 = 6, 2 x 6 = 12

N24
1/3 x 108 = 36, 3 x 36 = 108

W15
2 x 12 = 24, 1/2 x 24 = 12

W18
3 x □ = 126

(From UPG IV)

N2
8 x 3 = 24, 1/3 x 24 = 8

N5
3 x 13 = 39, 1/3 x 39 = 13

N12
2 x 268 = 536, 1/2 x 536 = 268

N13
33 1/3 x 3 = 100, 100 ÷ 3 = 33 1/3

N18
3 x 36 = 108, 108 ÷ 3 = 36

N28
7 x 14 = 98, 98 ÷ 7 = 14

N30
13 x 8 = 104, 104 ÷ 8 = 13

N32
(16 x 12) + 8 = 200,

$$12\overline{)200}\quad 16\ R=8$$

Story Problems

(From UPG III)

N24
Share four pies fa ly among three children.

N25
Share $70 fairly between two children.

(From UPG IV)

N5
Share $20 fairly among three people.

W5
Share $10 fairly among four people.

N12
Share 375 apples fairly between two classes.

N18
Share 108 books fairly among three classes.

W13
Share 72 candies fairly among three children.

N28
Share 100 tulips fairly among seven people.

N30
Share 147 sandwiches fairly among the students in class.

N32
Put 200 eggs into cartons.

N33
Determine number of 5 admission tickets needed for 15 admissions.

DIVISION

Basic Facts and Mental Arithmetic

(From UPG III)

N2
1/2 x 8 = 4

G1
1/2 x 34 = 17

L4
There are eleven 4s in 44.

W5
1/2 x 48 = 24

N11
1/2 x 72 = 36

G4
36 ÷ 3 = 12

L8
1/3 x 18 = 6

N16
1/2 x 58 = 29

L9
1/2 x 200

N19
1/3 x 48 = 16

N24
1/3 x 999 = 333

N25
1/2 x 700 = 350

W13
1/2 x 4 = 2

W14
1/2 x 136 = 68

W15
1/2 x 24 = 12

L17
8 = 1/2 x 16

W17
1/3 x 3,000 = 1,000

(From UPG IV)

N5
1/2 x 9 = 4 1/2

G2
1/4 x 480 = 120

N9
30 ÷ 3 = 10

L5
4 ÷ 8 = 1/2

N10
1/2 x 54 = 27

W5
1/2 x 2.50 = 1.25

N12
1/2 x 38 = 19

N13
100 ÷ 4 = 25

W8
1/3 x 150 = 50

N18
27 ÷ 3 = 9

W9
1/2 x 52 = 26

L10
0 ÷ 2 = 0

N20
(35 + 1) ÷ 3 = 12

W10
1/3 x 54 = 18

N22
1/4 x 28 = 14

N23
1/2 x 24 = 12

N24
1/2 x 240 = 120

W13
1/3 x 72 = 24

N27
1/2 x 16 = 8

N31
86 ÷ 2 = 43

N32
48 ÷ 12 = 4

W16
412 ÷ 2 = 206

DIVISION

Properties

(From UPG III)

N16
1/2 x 114 =
(1/2 x 100) + (1/2 x 14)

W15
1/2 x 24 = (1/2 x 20) + (1/2 x 4)

(From UPG IV)

G2
1/4 x 480 = 1/2 x (1/2 x 480)

N9
50 ÷ 2 = 1/2 x 50

N12
1/2 x 536 = 536 ÷ 2

1/2 x 658 = (1/2 x 600) +
(1/2 x 50) + (1/2 x 8)

N13
1/2 x 10 = 10 ÷ 2

N18
1/3 x 108 = 108 ÷ 3

W9
1/2 x (10 + 4) = (1/2 x 10) + 2

1/2 x 52 = (1/2 x 50) + (1/2 x 2)

W10
(1/3 x 15) + 3 = 1/3 x (15 + 9)

N22
1/2 x 28 = (1/2 x 20) + (1/2 x 8)

N24
1/2 x 260 =
(1/2 x 200) + (1/2 x 60)

W13
1/3 x 105 =
(1/3 x 90) + (1/3 x 15)

Vertical Format and Algorithm

(From UPG IV)

N13
$$2\overline{)10}\quad 5$$

N18
$$3\overline{)108}\quad 36$$

N28
$$7\overline{)100}\quad 14\ R=2$$

N30
$$26\overline{)147}\quad 5\ R=17$$

N32
$$12\overline{)200}\quad 16\ R=8$$

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FRACTIONS

Equal Partitioning of Wholes

(From UPG III)

G1
A square is cut into two triangles by a diagonal line.

G4
A square is cut into two triangles by a diagonal line.

N24
1/3 x 1 = 1/3

G9
Divide a disk into two equal parts.

W13
Divide a square with an area of 4 square centimeters into two equal parts each with an area of 2 square centimeters.

G11
A square is cut into two triangles by a diagonal line.

L17
1/2 x 1 = 1/2

(From UPG IV)

W2
1/2 x 4 = 2

G2
Divide a rectangle into sixteen equal pieces.

W5
1/2 x 4 = 2

L10
Line segments are divided into two equal parts.

W10
1/2 x 4 = 2

W12
1/4 x 8 = 2

W13
1/5 x 10 = 2

G10
1/2 x 24 = 12

G11
1/2 x 1 = 1/2

W16
Determine what fractional part of each shape is shaded.

Story Problems

(From UPG III)

N24
Share 4 pies fairly among three children.

N25
Share fairly $7 between two children.

(From UPG IV)

N5
Share $200 fairly among three people.

W5
Share $10 fairly among eight people.

N12
Share fairly 536 cherries between two classes.

N18
Share fairly 192 balloons among three classes.

W13
Share 105 marbles fairly among three children.

FRACTIONS

Equal Partitioning of Sets

(From UPG III)

N2
1/2 x 8 = 4

G1
1/2 x 9 = 4 1/2

W4
1/2 x 22 = 11

G4
1/2 x 23 =
11 1/2

L8
1/3 x 6 = 2

N24
1/3 x 4 = 1 1/3

W13
1/2 x 23 =
11 1/2

W14
1/3 x 21 = 7

(From UPG IV)

N2
1/2 x 24 = 12

W4
1/2 x 9 = 4 1/2

W9
1/3 x 9 = 3

W10
1/2 x 17 =
8 1/2

Basic Facts and Mental Arithmetic

(From UPG III)

N2
1/2 x 8 = 4

G1
1/2 x 34 = 17

W5
1/2 x 28 = 14

N11
1/2 x 98 = 49

G4
1/2 x 36 = 18

L8
1/2 x 12 = 6

N16
1/2 x 9 = 4 1/2

L9
1/2 is not an
even number.

N19
1/3 x 75 = 25

N24
3 x 1 1/3 = 4

N25
1/2 x 7 = 3.50

W13
1/2 x 4 = 2

W14
1/2 x 7 = 3 1/2

W15
1/2 x 11 =
5 1/2

G11
1/2 + 1/2 = 1

L17
1/16 = 1/2 x 1/8

W17
1/3 x 75 = 25

(From UPG IV)

W2
3 1/2
two-centimeter
lengths are
7 cm long.

N5
1/2 x 11 =
5 1/2

G2
1/2 = 2/4 = 4/8
= 8/16

1/8 is halfway
between 0 and
1/4.

N9
1/2 x 80 = 40

N10
1/2 x 20 = 10

W5
1/2 x 5 = 2.50

N12
1/2 x 5 = 2 1/2

G4
1/2 is more
than 1/3.

N13
1/5 x 20 = 4

1/2 + 1/2 + 1/2
= 1 1/2

G5
25 cm = 2 1/2 dm

W8
1/2 x 428 = 214

N18
1/3 x 69 = 23

W9
1/2 x 34 = 17

N19
0.5 = 0.50 =
1/2

L10
1/2 = 2/4 = 4/8

4 x 1/8 = 4/8

N20
(36 - 10) ÷ 2 =
13

W10
1/2 = 6/12

N22
2 x 14 1/2 = 29

N23
1/2 x 24 = 12

N24
1/2 x 140 = 70

W13
1/3 x 105 = 35

N27
1/2 x 16 = 8

G11
2 1/2 + 7 1/2 =
10

N31
13 1/2 x 3 =
40 1/2

N34
1/2 x 64 = 32

NEGATIVES

Story Problems

(From UPG III)

W3
A child travels down in a faulty elevator.

N9
An elephant discovers that some peanuts are missing.

W8
Children are playing a spinner game.

(From UPG IV)

L2
An elephant collects peanuts in a bag.

N7
Peanuts are placed in a bag.

Properties

(From UPG III)

N9
$13 + \widehat{5} = 13 - 5$

N15
$100 - 69 = 100 + \widehat{69}$

N21
$124 + \widehat{4} = 124 - 4$

N23
$248 + \widehat{4} = 248 - 4$

N29
$80 + \widehat{2} = 80 - 2$

N33
$336 - 167 = 336 + \widehat{167}$

(From UPG IV)

N1
$369 + \widehat{221} = 369 - 221$

N7
$1 + \widehat{6} = 1 - 6$

N25
$100 + \widehat{4} = 100 - 4$

N27
$40 - 2 = 40 + \widehat{2}$

NEGATIVES

Basic Facts and Mental Arithmetic

(From UPG III)

W3
$\hat{1} - 5 = \hat{6}$

L4
$\hat{3} - 3 = \hat{6}$

N8
$0 - 2 = \hat{2}$

N9
$\hat{80} + 80 = 0$

N12
$5 - 10 = \hat{5}$

W6
$8 + \hat{8} = 0$

W7
$80 + \hat{4} = 76$

N15
$\hat{40} + 40 = 0$

L8
$2 - 3 = \hat{1}$

N16
$2 \times \hat{15} = \hat{30}$

W8
$0 - 50 - 50 - 50 - 20 = \hat{170}$

L9
$\hat{6}$ is an even number.

N18
$\hat{8} + 4 = \hat{4}$

N20
$\hat{7} + 4 = \hat{3}$

N21
$4{,}182 + \hat{4{,}182} = 0$

N22
$2 - 10 = \hat{8}$

N23
$450 + \hat{2} = 448$

L12
$4 + 4 + \hat{2} = 6$

N24
$1/3 \times \hat{6} = \hat{2}$, $3 \times \hat{2} = \hat{6}$

W12
$40 + \hat{3} = 37$

N26
$0 - 10 = \hat{10}$

W14
$40 + \hat{8} = 32$

N29
$38 = 40 + \hat{2}$

N30
$0 - 39 = \hat{39}$

W15
$20 + \hat{2} = 18$

W16
$28 + \hat{3} = 25$

N33
$\hat{100} + 100 = 0$

L17
$\hat{35} + 35 = 0$

W17
$\hat{100} + 20 = \hat{80}$

(From UPG IV)

N1
$369 + \hat{221} = 148$

W1
$7 - 9 = \hat{2}$

L2
$\hat{3} + 5 = 2$

N4
$7 - 10 = \hat{3}$

W2
$10 + \hat{4} = 6$

W3.
$(10 \times 100) + \hat{1} = 999$

N7
$4 - 9 = \hat{5}$

N9
$2 - 8 = \hat{6}$

W5
Complete an addition table. Example: "$\hat{3} + 10 = 7$."

N11
$20 + \hat{7} = 13$

W6
All negative numbers are less than 20.

$\hat{1} + 15 = 14$

G4
$\hat{1}$ is more than $\hat{5}$.

L7
$5 - 7 = \hat{2}$

N16
$400 - 630 = \hat{230}$

N17
$2 - 8 = \hat{6}$

L9
$\hat{8}$ is a multiple of 4.

W9
$8 - 10 = \hat{2}$

L10
$1 + \hat{1} = 0$

W10
$10 + \hat{4} = 6$

N21
$14 - 15 = \hat{1}$

W11
$0 - 20 - 20 - 20 + 50 = \hat{10}$

W12
$12 - 20 = \hat{8}$

N25
$5 \times \hat{8} = \hat{40}$

W13
$\hat{5} + 4 = \hat{1}$

N27
$\hat{4} + 20 = 16$

L13
$5 - 11 = \hat{6}$

W14
$80 + \hat{4} = 76$

L14
$\hat{3} + 5 = 2$

L15
12 is a common multiple of 3 and 4.

W15
$8 - 11 = \hat{3}$

N34
$\hat{5} - 1 = \hat{6}$

W16
$8 - 11 = \hat{3}$

N35
$84 + \hat{1} = 83$

92

NEGATIVES

Joining Sets

(From UPG III)

N9
$13 + \hat{5} = 8$

(From UPG IV)

N7
$1 + \hat{6} = \hat{5}$

Estimation

(From UPG III)

L6
$36 + \hat{6}$

(From UPG IV)

W14
$40 + \hat{8}$

On the Minicomputer

(From UPG III)

N9
$154 + \hat{89} = 65$

W6
$39 + 18 = \hat{21}$

W7
$40 + 3 = \hat{37}$

N15
$100 + \hat{69} = 31$

L10
$80 + \hat{4} = 76$

N21
$148 + \hat{80} = 68$

N23
$305 + \hat{80} = 225$

W12
$40 + \hat{3} = 37$

W14
$40 + \hat{20} = 20$

N29
$4 \times (100 + \hat{2}) = 392$

W15
$20 + \hat{2} = 18$

W16
$40 + \hat{20} = 20$

N33
$336 + \hat{167} = 169$

W17
$200 + \hat{100} = 100$

(From UPG IV)

N1
$369 + \hat{221} = 148$

W1
$16 + \hat{4} = 12$

W2
$20 + 10 = \hat{10}$

N7
$68 + \hat{29} = 39$

W10
$79 + \hat{68} = 11$

W12
$1{,}000 + \hat{1} = 999$

N25
$5 \times 92 = 5 \times (100 + \hat{8})$

N27
$3 \times 90 = (3 \times 100) + (3 \times \hat{10})$

W14
$40 + \hat{1} = 39$

W15
$\hat{8} + 4 = \hat{4}$

N35
$8 + \hat{4} = 4$

MULTIPLES AND DIVISORS

Multiples

(From UPG III)

N4
Of 2, 3, 5, 7

L4
Of 3, 4, 5

W4
Of 2, of 10

N10
Of 3, of 10

W5
Of 5, of 9

L6
Of 10

N12
Of 2

W6
Of 2, 3, 4

N14
Of 10

W7
Of 2, 3, 5

L9
Of 3, 4, 5

N18
Of 4

W9
Of 11

L10
Of 3, of 4

N20
Of 4, of 5

N22
Of 2

W11
Of 3, 4, 5

N24
Of 3

L13
Of 3, of 5

W13
Of 2, 3, 4, 5

W14
Of 3, 4, 5

L15
Of 2, of 3

W16
Of 2 to 10

W17
Of 3, 4, 5

(From UPG IV)

L1
Of 3, 5, 15

N2
Of 3, of 8

W1
Of 4, of 2

L2
Of 3, 4, 5

W2
Of 2, 4, 7, 10

W3
Of 4

L4
Of 2, 4, 6, 12

W4
Of 2, 3, 4

G3
Of 4

W5
Of 3, of 4

W6
Of 2

N14
Of 10

L9
Of 4, of 5

W9
Of 3

W10
Of 4, of 5

W11
Of 2, of 3

G8
Of 2

N23
Of 2, 3, 4, 5, 6, 8

W12
Of 2, 3, 5

L12
Of 0 to 64

N26
Of 10

W13
Of 3, 5. 15

L13
Of 4, 7, 10

W14
Of 2

L15
Of 3, of 4

N33
Of 3, 4, 5, 10

L16
Of 0 to 150

W16
Of 2, 3, 4, 6, 10

MULTIPLES AND DIVISORS

Common Multiples

(From UPG III)

L4
Of 3 and 4

Of 4 and 5

L9
Of 3 and 4

Of 3 and 5

L10
Of 3 and 4

L13
Of 3 and 5

(From UPG IV)

L1
Of 3 and 5

L4
Of 2, 4, and 6

L9
Of 4 and 5

W10
Of 4 and 5

W11
Of 2 and 3

N23
Of 2 and 3, 3 and 5,
4 and 6, 5 and 8

W13
Of 3 and 5

L13
Of 4 and 10

L15
Of 3 and 4

N33
Of 3 and 4, 3 and 5,
3 and 10

L16
Of 4, 10, and 15;
of 12 and 18

W16
Of 4 and 6,
of 4 and 10

Divisors

(From UPG III)

W16
20 is a multiple of
1, 2, 4, 5, 10, and 20.

W17
100 is a multiple of
1, 2, 4, 5, 10, 20,
25, 50, and 100.

(From UPG IV)

L16
Of 4 and 6, 12 and 18,
24 and 32

DECIMALS

(From UPG III)

N25
3.5 = 3.50 = 3 1/2

N27
75 = 75.0 = 75.00

(From UPG IV)

N3
0.40 to 5.85

W2
0.79 to 8.60

N5
0.26 to 66.66...

W4
$0.39, $0.91, and $1.00

N9
1/2 x 5 = 2.5

82 ÷ 8 = 10.25

W5
15 = 15.0 = 15.00

0.26 to 20.06

N12
2 1/2 = 2.5

G5.
6 cm = 0.6 dm

W9
0.49 to 1.45

N19
0.1 = 0.10

L10
1/2 = 0.50

W10
0.29 to 3.97

N22
2 x 14.5 = 29

N23
5 x $0.80 = $4.00

W12
0.5 = 0.50 = 1/2

$0.16 to $1.31

W13
0 to 1.30

N31
27 ÷ 2 = 13.5

N33
2 x $5.50 = $11

W17
0 to 10

PROBABILITY, STATISTICS, AND GRAPHING DATA

(From UPG III)

L8
Predict and record the result of six random selections of one of two marbles.

L12
Predict, record, and compare the outcomes (sums) of three rolls of two distinct dice.

L14
Record the number of points by which a basketball team won or lost each game during the season.

Predict the result of six random selections of one of six marbles.

(From UPG IV)

L7
Predict whether the rules of a game will be fair.

Determine that two teams have 10/18 and 8/18 chances to win.

L8
Use a bar graph to compare the season's scores of two basketball teams.

Record the wins and losses of a basketball team in a bar graph.

L14
Predict whether the rules of a game will be fair.

Determine that there are 25 chances out of 40 of getting a false statement in a game.

APPLICATIONS

(From UPG III)

N2
Another name for twelve hundred is one thousand, two hundred.

N4
Find a way to put 50¢ postage on a package using 3¢, 5¢, and 7¢ stamps.

G1
Decide how to color exactly one-half of a gridded shape red.

W3
Determine the number of floors between two floors in a skyscraper.

G2
Recognize north, south, east, and west on a map.

L4
Count by 3s using a hand-calculator.

N8
-2 represents owing 2¢.

W4
Determine the value of a combination of coins.

G3
Use a 100 cm tape measure to measure the length of a zigzag path.

W5
Find several combinations of quarters, dimes, and nickels with values of 50¢.

G4
Decide how to color exactly one third of an irregular shape red.

G5
Determine the area of a shape on a grid in square centimeters.

N15
Find many combinations of bills with values of $100.

G6
Decode a message.

N17
Use a road map to determine and compare the lengths in kilometers of various routes between two towns.

N18
Find a way to make a hand-calculator count by 4s.

W9
Determine some of the possible scores of a spinner game.

Count by 11s using a hand-calculator.

W10
Use a road map to determine and compare the lengths in kilometers of various routes between two towns.

G7
Recognize north, south, east, and west on a map.

98

APPLICATIONS - Continued

L11
Investigate family relationships including maternal grandparents, aunts, and cousins.

N24
Decide how to divide a circle into three pieces of the same size.

G9
Decide how to color exactly one-third of a gridded shape red.

N25
Nine dimes and one quarter are equal to $1.15.

W13
Determine the areas in square centimeters of shapes on a 2 cm grid.

Determine the values of various combinations of coins.

N27
Eight quarters are equal to $2.

L14
11 represents a loss by 11 points in a game.

W14
Determine the lengths of lines on a 4 cm grid.

G10
1 meter = 100 cm

Draw a zigzag path that is 100 cm long.

W15
Count by 3s, 4s, and 5s with a hand-calculator.

N31
Use a road map to determine and compare the lengths in kilometers of various routes between two cities.

L16
Represent 100 blocks in a Venn diagram if 75 green blocks are in one set and 50 cubes are in the other.

W16
Find a combination of coins with a value of 20¢.

G12
Key a map of hiking paths so that there will be several round-trip paths that do not overlap.

W17
Twenty nickels are equal to $1.00.

Find a combination of coins with a value of $1.00.

G13
Key a map of hiking paths so that there will be several round-trip paths that do not overlap.

Find a way to follow all the paths on a map exactly once and return to your starting point.

APPLICATIONS - Continued

(From UPG IV)

N3
Find a combination of coins with a value of $2.

Make purchases at a stationery store.

N4
Find a way to calculate 83 - 25.

W2
Draw a zigzag path that is 18 cm long on a 2 cm grid.

G1
Recognize north, south, east, and west on a map.

N5
Find several combinations of coins or bills with values of $200.

Share $20 fairly among three people.

N6
Start at 1 and find many numbers that can be reached by multiplying by 10 twice and adding 1 nine times.

G2
Divide a circle into twelfths.

W4
Find a combination of coins with a value of 65¢.

Color 1/2 of a circle that is divided into thirds red.

G3
Draw a circle with a given radius.

N9
Use a hand-calculator to verify the answers to division problems done mentally.

L5
Solve addition problems in modulo 10.

W5
Share fairly $10 among eight people.

$3.35 + $4.65 = $8.00

N11
Pair subtraction problems that have the same answer.

L6
Solve addition problems in modulo 10.

N12
Share 375 apples fairly between two classes.

N13
Find a way to make a hard subtraction problem easier.

Determine the subtrahend in an incomplete calculation.

L7
Use tables of calculations to determine all of the possible numbers that can be formed using given sets of symbols and numerals.

G5
Use a 100 cm tape measure to measure the lengths of line segments in decimeters.

25 cm = 2 1/2 dm = 2.5 dm

100

APPLICATIONS - Continued

L8
11 indicates a loss by 11 points.

N16
Find an easy way to solve a hard subtraction problem.

G6
Find a point on a grid that is 5 blocks from each of 6 points.

N18
Share 192 balloons fairly among three classes.

W9
Determine n when 2 x n¢ + 9¢ = 61¢.

Color one third of each shape red.

Draw a short zigzag path between two dots but around an obstacle.

Use a 100 cm tape measure to measure the length of a zigzag path.

Determine the values of various combinations of coins.

N19
One fourth of a dollar is a quarter or $0.25.

Show where various amounts of money would be on a "dollar" number line.

N20
Use a hand-calculator to identify an unknown number.

W10
Color one half of a shape red.

$1.34 + $2.66 = $4.00

G7
Find a way to tour a house walking through as many doors as possible without going through any door twice.

W11
Determine some of the possible scores in a spinner game.

G8
A square has a perimeter of 40 cm.

440 cm = 4 m 40 cm

N23
Determine the savings if a purchase can be made for 72¢ instead of 80¢.

Determine which price is the better deal if you can buy 3 items for 40¢ or 2 items for 24¢.

8 x $1.20 = $9.60

L11
Solve addition and multiplication problems in modulo 10.

W12
Find a combination of coins with a value of $1.31.

Determine what fractional part of a shape is colored red.

APPLICATIONS - Continued

G9
Build or block doors in a house so that it will be possible to make a round trip walk that goes through each of the doors of the house exactly once.

W13
Determine what fractional part of each shape is colored.

Find a way to tour a house, walking through each door exactly once.

L13
Use tables of calculations to determine all of the possible numbers that can be represented using given sets of symbols and numerals.

N28
Calculate 200 ÷ 9 using repeated subtractions.

G10
Draw on grid paper many rectangles with areas of 12 square centimeters.

L14
Use tables of relationships to determine all of the possible outcomes that can be formed using given sets of numbers and relations.

G11
Draw on grid paper many rectangles each with a perimeter of 20 cm.

Use a 100 cm tape measure to determine the perimeters of rectangular objects.

N31
Do simple calculations using a hand-calculator.

N32
26 students are to be accompanied by at least one adult for each group of five students.

An egg carton will hold 12 eggs.

G12
Build or block doors in a house so that it is possible to walk through each door exactly once.

Draw a house plan that corresponds to a touring map.

N33
Determine which price is the better deal if three admissions cost $7 and five admissions cost $11.

Kilograms are units of mass.

Determine the savings if a purchase can be made for $16.50 instead of $20.

L17
Solve addition and multiplication problems in modulo 10.

G13
Surround as many squares as possible on a 3-by-3 grid.

REASONING

(From UPG III)

N1
Find many ways to put 12 on the Minicomputer.

L1
Describe hidden A-blocks.

Determine the labels of unknown sets in a Venn diagram.

N2
Determine the first and last numbers in a nine number +4 sequence when 40 is the middle number.

W1
Determine which operations can be used to relate two numbers.

L2
Determine which two operations can be replaced by a single operation.

W2
Determine which operations can be used to relate two numbers.

L3
Determine how many children have their names on one or both of two lists.

Recognize a set that is a subset of another set.

W3
Determine how to use +10, +5, +1, -10, -5, and -1 to go from 60 to 79.

N7
Recognize that 23 is two 10s and three 1s.

L4
Determine that $\widehat{13}$ is not a multiple of 3.

Determine that 4 x 39 is a common multiple of 4 and 3 without calculating.

N8
Find a way to go from 0 to 8 by adding 3s and subtracting 2s.

W4
Recognize when all possible plays in a game will be losing plays.

G3
Find the shortest path between two points but around an obstacle.

N9
Find many ways to use at least one negative checker to put 10 on the Minicomputer.

L5
Recognize that it is impossible for two students to receive the same name in a name exchange.

N10
Determine an operation that takes 18 and produces 48.

W5
Determine the labels of unknown sets in a Venn diagram.

Find several ways to represent 100 on the Minicomputer.

Determine a way to go from 0 to 20 by doubling and adding 1s.

REASONING - Continued

L6
Determine the labels of unknown sets in a Venn diagram.

Determine whether 96 ÷ 2 is a multiple of 10 or more than 50 without calculating.

N12
Determine an operation that takes 20 and produces 10.

Use clues to identify an unknown number on a number line.

W6
Use a set of numbers and a sequence of numerical relationships to make true statements.

N13
Recognize when all possible plays in a game will be losing plays.

Use the addition algorithm to determine a missing addend.

L7
Determine which two operations can be replaced by a single operation.

N14
Find an efficient way to go from 8 to 49 by adding 10s and 1s.

W7
Use a set of numbers and a sequence of numerical relationships to make true statements.

G5
Use two squares to form shapes with various areas.

L8
Determine the most likely outcome of six random selections of one of two marbles.

W8
Recognize that a score of 150 is impossible in a spinner game.

N17
Use a road map to find the shortest route between two towns.

L9
Recognize that the intersection of the set of squares and the set of triangles is empty.

N18
Determine whether 412 is a multiple of 4.

W9
Find several ways to get a score of 100 in a spinner game.

L10
Use clues to identify an unknown number.

N20
Recognize that four distinct, infinite +4 sequences would include all of the integers.

W10
Use a road map to plan a trip that is more than 400 km long and visits as few towns as possible.

G7
Explain why all the shortest paths between two homes go 5 blocks north and 7 blocks east.

N21
Find a way to put $\hat{9}$ on the Minicomputer with one positive and one negative checker.

REASONING - Continued

L11
Recognize that a person, whose mother is also your father's mother, is either your aunt or uncle.

N22
Recognize that subtracting 10 three times and then subtracting 7 is the same as subtracting 37.

W11
Recognize that each of the whole numbers is on one of the +4 sequences that begins at 0, 1, 2, or 3.

L12
Determine whether it is possible to win a game after the opponent's score is determined.

N24
Recognize that 3,021 is a multiple of 3 because 3 x 1,000 = 3,000 and 3 x 7 = 21.

W12
Recognize that there is no maximum number of checkers that can be used to show 37 on the Minicomputer.

L13
Determine the labels of unknown sets in a Venn diagram.

Determine that 2 x 45 is a multiple of 3 without calculating.

N26
Find a way to calculate 123 - 35 using repeated subtractions.

N27
Determine various combinations of coins and bills with values of $2.

L14
Determine the most likely outcome of six random selections of one of six marbles.

N28
Find a way to go from 0 to 523 by multiplying by 10s and adding 1s.

W14
Find several ways to put 12 on the Minicomputer using exactly two checkers.

Use clues to identify an unknown number.

N29
Use the addition algorithm to determine a missing addend.

L15
Determine how many times a rule directing students to move to another seat must be followed before it will return everyone to their original seat.

N30
Find several ways to subtract 39 using repeated subtractions.

W15
Use clues to identify an unknown number.

N31
Use a road map to find the shortest route between two cities.

Use the addition algorithm to determine a missing addend.

L16
Determine the correct distribution of 10 elements in a Venn diagram if one set has 7 elements and the other set has 8 elements.

REASONING - Continued

N32
Find a way to go from 63 to 39 by subtracting 10s and 1s.

Recognize that it is impossible to go from 33 to 39 by subtracting 1s and 10s.

W16
Find several ways to put 20 on the Minicomputer using exactly four checkers.

N34
Tell many number stories about a 4-by-7 array of dots.

W17
Find many ways to put 100 on the Minicomputer with exactly three checkers.

Find a way to go from 1 to 100 by multiplying by 3s and adding 1s.

N35
Recognize when all possible plays in a game will be losing plays.

N36
Find a way to go from 232 to 89 by subtracting 100s, 10s, and 1s.

Discuss methods for going from 89 to 232 if you double at least once.

W18
Use clues to identify an unknown number.

Determine n when n + 100 = 3n.

(From UPG IV)

L1
Determine whether 1,005 is a multiple of 5.

Determine when a permutation will return everyone to their original position.

W1
Find a way to go from 92 to 59 by subtracting 10s and 1s.

Put many numbers on the Minicomputer with exactly three checkers.

Recognize that Tom's sister's mother is also Tom's mother.

N3
Determine which two of six prices have a sum of $4.

L2
Use clues to identify an unknown number.

W2
Use clues to identify an unknown number.

Put numbers on the Minicomputer with exactly one positive and one negative checker.

Determine which pairs of relations can be replaced by a single operation.

Use the addition algorithm to find a missing addend.

Find a way to go from 0 to 312 by adding 1s or multiplying by 10s.

REASONING-Continued

G1
Explain why all of the paths between two homes go 5 blocks north and 7 blocks east.

Estimate the number of shortest paths from one point to another on a grid.

Use clues to determine the location of a point on a grid.

L3
Use clues to determine the labels of unknown sets in a Venn diagram.

W3
Use clues to identify an unknown number.

Recognize that one set is a subset of another.

Predict how many different numbers can be put on the ones' board of the Minicomputer with one (10) checker and one regular checker.

G2
Determine an operation that generates a given sequence.

N7
Use clues to identify an unknown number on the number line.

L4
Recognize two relations that can be replaced by one relation.

N8
Find an efficient way to go from 7 to 63 by doubling, adding 1s, or subtracting 1s.

W4
Use clues to identify an unknown number.

Put numbers on the Minicomputer using a given set of checkers.

Find a way to go from 0 to 32 by doubling and adding 1s.

G3
Determine an operation that relates given pairs of numbers.

N9
Use only the [2], [8], [+], [-], [x], [÷], and [=] keys of a hand-calculator to display odd numbers.

L5
Determine an operation that would produce a given sequence of numbers.

N10
Determine n when
$(n + 6) \times 2 - 10 + 5 = 21$.

REASONING-Continued

W5
Determine which two of six prices have a sum of $5.

Find a way to go from 0 to 503 by multiplying by 10s and adding 1s.

Use clues to identify an unknown number.

Put numbers on the Minicomputer by removing exactly one of a given set of checkers.

Use clues to determine the labels for unknown sets in a Venn diagram.

Put parentheses in a number sentence to name the smallest possible number.

W6
Identify the largest even number less than 5,000.

Use clues to identify an unknown number.

Recognize that the numbers in a +2 sequence are either all odd or all even.

Recognize that the numbers that are 3 more than an odd number are all even.

Identify n when 2n = n + 15.

G4
Identify the smallest number in a given set that is more than a given number.

L7
Predict the number of possible numbers that can be formed using a given set of symbols and numerals.

Change the rules of a game to make it fair.

N14
Find an efficient way to go from 3 to 48 by multiplying by 10s, adding 1s, and subtracting 1s.

W7
Use a set of numbers and a sequence of numerical relationships to make true statements.

G5
Find a short path around an obstacle between two points.

N15
Move checkers on the Minicomputer to represent 200.

L8
Use a bar graph to compare the seasons of two basketball teams.

W8
Find many ways to put 100 on the Minicomputer with exactly 10 checkers.

L9
Use clues to determine the labels of unknown sets in a Venn diagram.

Determine whether 4 x 17 is a multiple of 4 or 5 without calculating.

REASONING-Continued

W9
Determine n when 2n + 9 = 61.

Find a way to go from 4 to 57 by multiplying by 10s, adding 1s, or subtracting 1s.

7 + ☐ = 13

Determine an operation that takes 9 and produces 28.

Use clues to identify an unknown number.

N20
Determine n when
(n x 2 + 48) ÷ 2 - 27 = 86.

W10
Find a way to go from 9 to 109 by multiplying by 10s, adding 1s, or subtracting 1s.

Determine which two of six prices have a sum of $4.

Use a set of numbers and a sequence of numerical relationships to make true statements.

Put parentheses in number stories to make them true.

Determine whether 4 x 21 is a multiple of 4 or 5 without calculating.

Determine the labels of unknown sets in a Venn diagram.

Put numbers on the Minicomputer by moving exactly one checker in a given configuration.

G7
Explain why any walk that goes through each of the four doors of a room exactly once will either start and end inside the room or start and end outside the room.

W11
Discuss why it is impossible to have a score of 52 in a spinner game.

Use clues to identify an unknown number.

G8
Find an easy way to solve a long addition problem.

N23
Discuss when you would buy a three-punch ticket instead of a five-punch ticket if each entrance costs more on a three-punch ticket.

W12
Determine the identity of an unknown number on the number line.

Find a way to go from 105 to 134 by adding 10s and subtracting 1s.

Use clues to identify an unknown number.

Find a way to put 999 on the Minicomputer with one positive and one negative checker.

REASONING-Continued

G9
Explain why any walk that goes through each of the three doors of a room exactly once will either start inside and end outside, or start outside and end inside.

L12
Recognize that every number is a multiple of itself.

N26
Find an efficient way to go from 5 to 29 by multiplying by 10s, adding 1s, or subtracting 1s.

W13
Use clues to identify an unknown number.

Determine whether 5 x 13 is a multiple of 3 or 5 without calculating.

Use clues to determine the labels of unknown sets in a Venn diagram.

Use the addition algorithm to determine an unknown addend.

Determine which of a given set of numbers are possible scores in a spinner game.

N27
Find two operations that when applied consequetively will take 4 and produce 8.

L13
Predict the number of possible numbers that can be formed using a given set of symbols and numbers.

Use clues to identify an unknown number.

Determine which of a given set of numbers can be put on the Minicomputer by moving exactly one of four checkers.

Determine whether 44 + 8 is a multiple of 4 without calculating.

W14
Use clues to identify two unknown numbers.

Put numbers on the Minicomputer with one regular and one negative checker.

Estimate the number of numbers that can be represented on two Minicomputer boards with exactly one regular and one negative checker.

G10
Use a pattern of solutions to predict another solution to a problem.

L14
Determine whether two numbers are in the same +5 sequence.

Discuss how to change the rules of a game so that it will be fair.

REASONING-Continued

G11
Use a pattern of solutions to predict another solution to a problem.

N31
Find many ways to go from 7 to 100 using single-digit operations.

L15
Use clues to determine the labels of unknown sets in a Venn diagram.

Determine whether 4 x 15 is a multiple of 4 or 3 without calculating.

W15
Use a set of numbers and a sequence of numerical relationships to make true statements.

G12
Determine through which houses it is possible to walk going through each door exactly once.

Recognize the similarities between two problems.

N33
Discuss when you would buy a three-punch ticket instead of a five-punch ticket if each entrance costs more on a three-punch ticket.

Determine whether it is cheaper to buy ground beef in 1, 2, 3, or 4 kg packages.

L16
Recognize that 0 is a multiple of any number.

Find a set of numbers that fit a given relationship.

N34
Find a way to go between 14 and 40 by adding 1s, subtracting 1s, doubling, and halving.

W16
Use a set of numbers and a sequence of numerical relationships to make true statements.

Determine whether 7 x 13 is a multiple of 4 or 6 without calculating.

N35
Move checkers on the Minicomputer to represent 400.

W17
Use clues to identify an unknown number.

Determine n when $n + 70 = 3n$.

Identify an unknown number on the number line.

G13
Use a pattern of solutions to predict a solution to a similar problem.

RELATIONS AND FUNCTIONS

Representing and Interpreting

(From UPG III)

L5
Students exchange names.

W6
"I am less than you."

W7
"I am more than you."

L11
"You are my mother."
"You are my father."

W13
"I am less than you."

L15
Students exchange seats.

W17
"I am more than you."

(From UPG IV)

L1
Children exchange seats.

W1
"You are my sister."
"You are my mother."

W2
"I am more than you."
"I am less than you."

L4
Children exchange seats.

W5
"You are my father."
"You are my brother."

W10
"You are my mother."
"You are my father."
"You are my brother."

L12
Two numbers may talk to each other if and only if one of them is a multiple of the other.

W13
Two numbers may talk to each other if and only if one of them is a multiple of the other.

W15
"I am more than you."

L16
Two numbers may talk to each other if and only if one of them is a multiple of the other.

W16
"I am more than you."
"I am less than you."

Two numbers may talk to each other if and only if one is a multiple of the other.

RELATIONS AND FUNCTIONS

Composition

(From UPG III)

N2
Adding 4 five times is the same as adding 20.

L2
Yellow followed by blue is red.

N6
Adding 10 three times is the same as adding 30.

N10
Adding 10 twelve times is the same as adding 120.

N12
Subtracting 10 twice is the same as subtracting 20.

L7
Yellow followed by blue is red.

Cyclic permutations

L10
Recognize that the composition of multiplication and addition is not commutative.

N22
Subtracting 10 three times is the same as subtracting 30.

N26
Subtracting 10 four times and then subtracting 6 is the same as subtracting 46.

W14
Subtracting 10 five times is the same as subtracting 50.

L15
Permutations

N30
Subtracting 10 three times and 9 once is the same as subtracting 39.

N32
Subtracting 10 twice and 1 four times is the same as subtracting 24.

L17
Recognize that the composition of addition and multiplication is not commutative.

N34
Doubling twice is the same as multiplying by 4.

N36
Subtracting 100 once, 10 four times, and 1 three times is the same as subtracting 143.

W18
Adding 5 twenty times is the same as adding 100.

RELATIONS AND FUNCTIONS

Composition - Continued

(From UPG IV)

L1
Permutations

N2
Multiplying by 3 and then by 2 is the same as multiplying by 6.

W1
Subtracting 10 three times and 1 three times is the same as subtracting 33.

N4
Subtracting 30 and 7 is the same as subtracting 37.

W2
Doubling twice is the same as multiplying by 4.

Subtracting 100 twice, 10 twice, and 1 three times is the same as subtracting 223.

L4
Blue followed by blue is red.

W4
Subtracting 10 three times and then subtracting 1 four times is the same as subtracting 34.

W5
Subtracting 10 twice and 7 once is the same as subtracting 27.

Multiplying by 3 and then by 2 is the same as multiplying by 6.

W6
Adding 2 three times and 3 three times is the same as adding 15.

G4
Cyclic permutations

N16
Subtracting 100 three times and 20 once is the same as subtracting 320.

W9
Adding 5 then subtracting 1 is the same as adding 4.

Subtracting 10 three times and 1 four times is the same as subtracting 34.

W10
Adding 3 three times is the same as adding 9.

N22
Doubling three times is the same as multiplying by 8.

N24
Taking one-half of a number then multiplying by 10 is the same as multiplying by 5.

W12
$2 \times (12 + 3) = (2 \times 12) + 3 + 3$

Subtracting 5 twice is the same as subtracting 10.

Doubling three times is the same as multiplying by 8.

W13
Multiplying by 3 and then by 2 is the same as multiplying by 6.

N31
Doubling and then multiplying by 3 is the same as multiplying by 6.

W15
$2(n + 3) = 2n + 3 + 3$

W16
Subtracting 15 twice is the same as subtracting 30.

W17
Adding 2 twenty times is the same as adding 40.

RELATIONS AND FUNCTIONS

Converse

(From UPG III)

N2
+20, -20

N11
1/2x, 2x

N16
+1, -1; 2x, 1/2x

N24
3x, 1/3x

(From UPG IV)

L5
⊕ 2, ⊕ 8; ⊕ 3, ⊕ 7;
⊕ 5, ⊕ 5

N10
+6, -6; 2x, 1/2x

L6
⊕ 1, ⊕ 9; ⊕ 2, ⊕ 8;
⊕ 3, ⊕ 7; ⊕ 4, ⊕ 6

W7
+7, -7

W9
+9, -9; 2x, 1/2x

N20
+48, -48; x2, ÷2

N25
+256, -256

W13
+29, -29; +30, -30;
x2, ÷2; x3, ÷3

N31
x5, ÷5; +5, -5

7 x 5 x 3 - 5 = 100,
(100 + 5) ÷ 3 ÷ 5 = 7

RELATIONS AND FUNCTIONS

Numerical Operations

(From UPG III)

N2
+2 to +20, -20

W1
+1 to +11, -1 to -15, 2x, 3x

N4
+2, +3

W2
+2 to +300, -2 to -250, 2x to 6x

N6
+10, +30

W3
+1, +5, +10, -1, -5, -10

N8
+3, -2

W4
+1, +2, +5, +10, -1, -2, 2x

N10
+3, +5, +10

W5
+1 to +10, -3, -4, 2x, 3x, 1/2x

N11
2x, 1/2x

N12
-4, -10, -24

W6
+1 to +10, -1, -2, -4, 2x, 3x

N14
+1, +10

W7
+1 to +36, -1 to -23, 2x

N16
+1, -1, 2x, 1/2x

N18
+4

L10
+3, 2x

N20
+4, +5

N22
-5, -7, -10, -30

W11
+3, +4, +5

N24
3x, 1/3x

N26
-6, -10, -40, -46

W13
+1, +3, +5, +10, -1, -2, 2x

N28
+1, 10x

W14
+3 to +8, -3 to -50, 2x, 3x, 1/2x

N30
+1, -9 to -40

W15
+4, -4, 2x, 1/2x

N32
-1 to -100

W16
+1 to +10, $\hat{+3}$, 2x

L17
+1, +2, 1/2x

N34
2x, 4x

W17
1+, +5, +15, -3, -8, -10, 2x, 3x, 1/2x, 1/3x

N36
-1, -10, -100, -143

W18
+5 to +100, 2x, 3x

(From UPG IV)

N1
$\hat{+22}$, $\hat{+48}$

N2
2x, 3x, 6x

W1
+1, +2, +4, +5, +10 -3, 2x

L2
+5

N4
+3, -2 to -40

W2
+1, +2, +3, -1, -4, -10, -100, 2x, 3x, 4x

N6
+1, 10x

W3
+4

G2
1/2x

N8
+1, -1, 2x

W4
+1, +4, +10, +100, -1, -10, 2x

RELATIONS AND FUNCTIONS

Numerical Operations - Continued

L5
⊕ 2 to ⊕ 8

N10
+4, +5, +6, +9, +10, -4, -5, -6, -9, -10, 2x, 1/2x

W5
+1, +3, -6, -7, -10, 2x, 4x, 6x, 10x

L6
⊕ 1 to ⊕ 9

N12
1/2x

W6
+2, +3, 2x

N14
+1, -1, 10x

W7
+6, +7, -7, 2x

N15
+10, +16, +18, +99

N16
+2, +3, -8 to -397

N17
-7

W9
+1, +2, +4, +5, +9, +10, -1, -9, -10, -34, 2x, 10x, 1/2x

L10
1/2x

N20
+24, +27, +34, +45, +48, -24, -27, -34, -45, -48, x2, x3, x5, x6, x10, ÷2, ÷3, ÷5, ÷6, ÷10

W10
+1 to +20, -1, 2x, 10x, 1/2x, 1/3x, ⊕ 9

N21
-15

N22
+10, 2x, 4x, 8x

W11
+5

L11
2 ⊗

N24
5x, 10x, 1/2x

W12
+1, +2, +3, +10, -1, -5, -10, 2x, 8x, 10x

N25
+256, -28, -43, -256

N26
+1, -1, 10x

W13
+4, +29, +30, -29, -30, x2 to x9, ÷2, ÷3

M27
+2 to +30, -8, -18, 4x, 1/2x

W14
2x

L14
"is in the same +5 sequence"

"is in the same +10 sequence"

N30
+1, +8, +40, -8, -16, -26, -80

N31
+1 to +46, -1 to -69, x1 to x9, ÷1 to ÷9

N32
-8, -48, -79, -364

W15
+3, +5, +8, +10, -1, -2, -4, -100, 2x, 3x, 10x

N34
+1, -1, 2x, 1/2x

W16
+10, +29, +48, -15, -30, -56, 2x, 3x, ÷2

N35
+1 to +390, -1 to -200

L17
2 ⊗ to 9 ⊗

W17
+2, +3, +70, 3x

SORTING AND CLASSIFYING

(From UPG III)

L1
A-blocks using a Venn diagram

L3
Children using a Venn diagram

L4
Numbers using a Venn diagram

W4
Numbers using a Venn diagram

Even numbers

N10
Multiples of 3

W5
A-blocks using a Venn diagram

Numbers using a Venn diagram

L6
A-blocks using a Venn diagram

Numbers using a Venn diagram.

N12
Even numbers

W6
Numbers using a Venn diagram

W7
Numbers using a Venn diagram

L9
A-blocks using a Venn diagram

Numbers using a Venn diagram

N18
Even numbers

Multiples of 4 using a Venn diagram

W9
Numbers using a Venn diagram

L10
Numbers using a Venn diagram

N20
Even and odd numbers

N22
Odd and even numbers

N24
Multiples of 3 using a Venn diagram

L13
A-blocks using a Venn diagram

Numbers using a Venn diagram

W13
Numbers using a Venn diagram

W14
Numbers using a Venn diagram

W16
Numbers using a Venn diagram

L17
Even and odd numbers

W17
Numbers using a Venn diagram

SORTING AND CLASSIFYING - Continued

(From UPG IV)

L1
Multiples of 3, 5, 15

W1
Numbers using a Venn diagram

L2
Numbers using a Venn diagram

W2
Numbers using a Venn diagram

L3
A-blocks using a Venn diagram

W3
Numbers using a Venn diagram

Even and odd numbers

L4
Multiples of 2, 4, 6, 12

W4
Numbers using a Venn diagram

N9
Odd numbers

L5
Even and odd numbers

W5
A-blocks using a Venn diagram

L6
Even and odd numbers

W6
Even numbers

L9
A-blocks using a Venn diagram

Numbers using a Venn diagram

W9
Numbers using a Venn diagram

W10
A-blocks using a Venn diagram

Numbers using a Venn diagram

W11
Numbers using a Venn diagram

L11
Even and odd numbers

W12
Numbers using a Venn diagram

W13
A-blocks using a Venn diagram

Numbers using a Venn diagram

L13
Numbers using a Venn diagram

W14
Numbers using a Venn diagram

Even and odd numbers

G10
Objects with square corners

L14
True and false statements

L15
A-blocks using a Venn diagram

Numbers using a Venn diagram

W15
Numbers using a Venn diagram

G12
Rooms with even and odd numbers of doors

W16
Numbers using a Venn diagram

L17
Even and odd numbers

PATTERNS

(From UPG III)

N1
8 + 2 = 10; 80 + 20 = 100;
800 + 200 = 1,000

N2
2 x 6 = 12; 2 x 60 = 120;
2 x 600 = 1,200

N3
2 x 4 = 8; 2 x 40 = 80;
2 x 400 = 800;
2 x 4,000 = 8,000

N6
Counting by 10s

N8
Counting backwards by 5s

N10
Counting by 5s and 10s

N14
Counting by 10s

N18
In a sequence of numbers

W9
Counting by 11s

L10
In an array of numbers

N20
In a sequence of numbers

G7
In an arrangement of dots on a grid

N22
Subtracting 10s

W11
In a sequence of numbers

Counting by 5s

G8
In an arrangement of dots on a grid

N23
Multiplying by 10s

N28
Multiplying by 10s

W15
Counting by 5s

N33
n - 8 = (n - 10) + 2

L17
Eight calculations have only four different answers.

Counting by 2s

N34
A 4-by-7 array of dots

N35
Multiplying by 10s

W18
Adding 100s

PATTERNS - Continued

(From UPG IV)

N1
In a sequence of calculations

W1
In an arrangement of numbers in a table

W2
$8 = \widehat{10} + 2$, $8 = 10 + \widehat{2}$

G1
In an arrangement of dots on a grid

N5
In a sequence of plays on the Minicomputer

N6
Multiplying by 10s

The digits of each of a given set of three-digit numbers have a sum of 10.

N7
$4 - 9 = \widehat{5}$, $9 - 4 = 5$

W4
In an arrangement of numbers in a table

G3
In an arrangement of dots on a grid

In a sequence of numbers

L5
Counting by 2s

In a sequence of calculations

N11
In a sequence of subtraction problems with the same answer

L6
In a sequence of calculations

N14
In a sequence of calculations

W8
In a sequence of plays on the Minicomputer

G6
In a sequence of numbers

N17
In a sequence of calculations

W9
In a sequence of calculations

N19
Multiplying by 10s

W11
Counting by 5s

G8
Sums of 40

N24
Multiplying by 10s

W12
In a sequence of calculations

N26
Multiplying by 10s

W13
In a sequence of calculations

G10
In an arrangement of dots on a grid

N29
3 x 4, 3 x 40, 3 x 400, 3 x 4000

G11
In an arrangement of dots on a grid

W17
In a sequence of numbers

G13
In a sequence of numbers

NETWORKS

(From UPG III)

G12
Paths on a map

G13
Paths on a map

(From UPG IV)

G4
Trees

G7
Touring houses

G9
Touring houses

W13
Touring houses

G12
Touring houses

Paths on a map

G13
Pencil tracings

TAXI-GEOMETRY

(From UPG III)

G2
A child walks along a shortest path to grandmother's house.

G7
Find many places that are equidistant from the movie theater and the skating rink.

G8
Two children want to meet at a place that is equidistant from their homes.

(From UPG IV)

G1
Linda's house is 7 blocks from Nora's house and 5 blocks from Grandmother's house.

G3
Find all of the places that are 4 blocks from Nora's house.

G6
Find the subway station that is closest to Nora's house.

TRANSFORMATIONAL CONCEPTS

(From UPG III)

G1
Cut a shape in half using a line of symmetry.

W4
Cut a shape in half using a line of symmetry.

G4
Divide a shape on a grid into three symmetric parts.

Cut a shape in half using a line of symmetry.

W13
Cut a shape in half using a line of symmetry.

W14
Decide how to cut a shape so that all parts will look the same.

MEASUREMENT

Area

(From UPG III)

G1
Determine one-half the area of a shape on a grid.

W4
Determine one-half the area of a gridded shape.

G4
Determine one-half the area of a shape on a grid.

G5
Determine the area of a shape on a 1 cm grid.

W13
Determine the areas of shapes on a 2 cm grid.

G11
Estimate and determine the areas of shapes on a 1 cm grid.

W16
Find a shape with an area of 20 square centimeters on a 2 cm grid.

(From UPG IV)

W2
Determine the areas of shapes on a 2 cm grid.

G2
Subdivide a shape with an area of 480 square centimeters.

W5
Determine the areas of shapes on a 2 cm grid.

W10
Determine the areas of shapes on a 2 cm grid.

G8
Four 10 cm squares fit into one 20 cm square.

W12
Draw shapes with an area of 27 square centimeters on a 3 cm grid.

G10
Draw rectangles with an area of 12 square centimeters on grid paper.

W16
Determine the areas of shapes on a 2 cm grid.

MEASUREMENT

Length

(From UPG III)

G2
Determine and compare the lengths of paths on a grid.

G3
Determine and compare the lengths of zigzag paths measured in centimeters.

G5
Determine the length of a line in centimeters.

G6
Estimate and measure the distance between two points with a metric ruler.

N17
Use a road map to determine and compare the lengths in kilometers of trips.

W10
Use a road map to determine and compare the lengths in kilometers of trips.

G7
Compare and determine the lengths of paths on a grid.

G8
Compare and determine the lengths of paths on a grid.

W13
Determine the lengths of lines on a 2 cm grid.

W14
Determine the lengths of lines on a 4 cm grid.

G10
Estimate, determine, and compare the lengths of various objects with a 100 cm tape measure.

N31
Use a road map to determine and compare the lengths in kilometers of various routes between two cities.

W16
Find a line with a length of 20 cm on a 2 cm grid.

W17
Draw a zigzag path with a length of 100 cm on a 5 cm grid.

(From UPG IV)

W2
Draw a zigzag path that is 21 cm long on a 2 cm grid.

G1
Determine and compare the lengths of paths on a grid.

G3
Determine the lengths of paths on a grid.

W5
Determine the lengths of zigzag paths on a 3 cm grid.

G5
Determine and compare the lengths of paths measured in decimeters.

G6
Compare and determine the lengths of paths on a grid.

MEASUREMENT

Length - Continued

W9
Determine and compare the length of a zigzag path measured in centimeters.

G8
Estimate, determine, and compare the length of a zigzag spiral to 1 meter.

G10
Determine and compare the perimeter of rectangles with an area of 12 square centimeters.

G11
Use 100 cm tape measures to determine the perimeters of rectangular objects.

Draw rectangles with a perimeter of 20 cm on grid paper.

W16
Determine the lengths of zigzag paths on a 2 cm grid.

EUCLIDEAN CONCEPTS

Shapes

(From UPG III)

L1
A-blocks

G1
Squares, triangles

L6
A-blocks

G4
Squares, triangles

G5
Squares

L9
A-blocks

G8
Rectangles, squares

L12
Cubes

Recognize a shape that can be folded to form a cube.

G9
Circle, rectangle

L13
A-blocks

(From UPG IV)

L3
A-blocks

G2
Rectangles, circles

G3
Circles, taxi-circles

W5
A-blocks

G6
Squares

L9
A-blocks

W10
A-blocks

G8
Squares

W13
A-blocks

G10
Squares, rectangles, triangles

G11
Rectangles, squares

L15
A-blocks

G13
Squares, rectangles

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